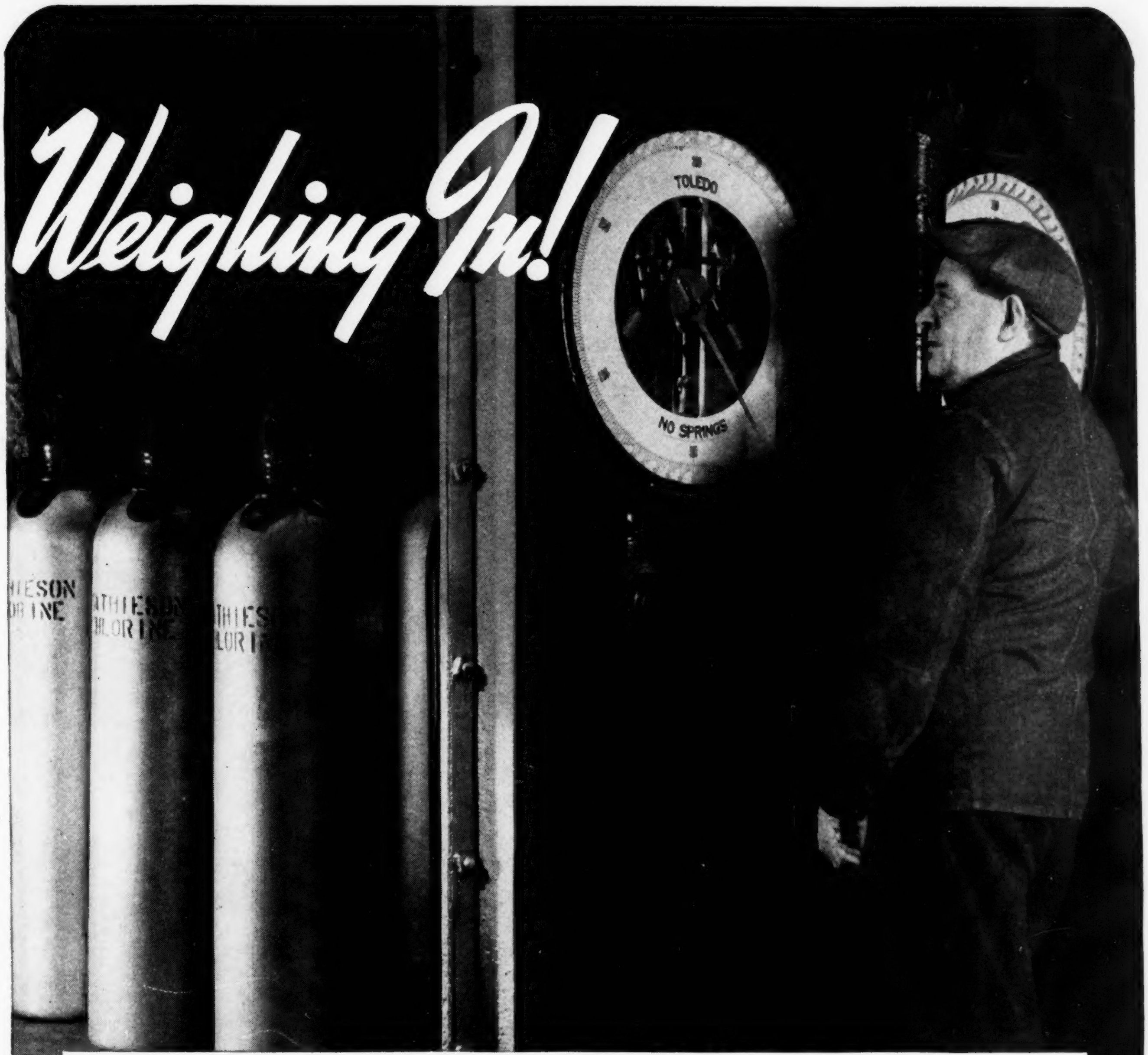


This is one time correct weight is over-weight. When Tom McKnight, for seventeen years a Mathieson "filler", fills up those cylinders of liquid chlorine, he cannily sees to it that each cylinder "weighs in" at a bit above final weight. Then the excess gas is blown off to bring the cylinders to their exact weight and remove any non-condensable gases.

The same careful attention to detail marks every step of the process of preparing Mathieson Liquid Chlorine for the market. Rigid care is exercised to preserve the original purity of the product. Every container is thoroughly cleaned, dried and inspected before filling. Valves and valve seats are completely cleaned, inspected, reconditioned, tested for leakage, and retested after the cylinders are filled.

Scrupulous attention to these and many other important details has brought Mathieson its enviable reputation as one of the most dependable sources of supply of liquid chlorine.

Mathieson Chemicals

THE MATHIESON ALKALI WORKS (INC.)
60 E. 42ND STREET, NEW YORK, N. Y.

SODA ASH . . . CAUSTIC SODA . . . BICARBONATE OF SODA . . . LIQUID CHLORINE . . . BLEACHING POWDER . . . HTH PRODUCTS . . . AMMONIA, ANHYDROUS and AQUA . . . FUSED ALKALI PRODUCTS . . . CCH (INDUSTRIAL HYPOCHLORITE) . . . DRY ICE . . . LIQUID CARBON DIOXIDE . . . ANALYTICAL SODIUM CHLORITE . . . GYPSUM PRODUCTS

The Reader Writes:—

Chemically Trained P.A.'S?

I notice that you are receiving a number of letters in regard to Ernest Bridgwater's article in the March issue, entitled "Should Salesmen Be Chemically Trained?"

I myself, thoroughly enjoyed and concurred with Mr. Bridgwater's article and complimented him on its timely interest.

This raises a question in my mind whether an article entitled "Should Purchasing Agents Be Chemically Trained?" would not also be timely, particularly in regard to the interest shown in Mr. Bridgwater's paper.

If salesmen should be chemically trained as seems to be the general feeling of the letters you are receiving, then the purchasing agents should have the same background.

I should think such an article would be of interest to your readers and would supplement and round out the discussion initiated by Ernest Bridgwater.

Wilmington, Del. DOUGLAS G. STEWART,
Asst. Div. Pur. Agt.,
E. I. du Pont de Nemours & Co.

"Doubly Welcome"

Please accept my sincere compliments for the article on "Printing Inks" by Dr. Gessler. The field has been so systematically neglected that any publication, particularly one of such excellence, is doubly welcome.

Cleveland, Ohio. M. MERLUB-SOBEL,
Head Chemical Mfg. Dept.,
Addressograph-Multigraph Corp.

We Solemnly Promise To

All parts of CHEMICAL INDUSTRIES are very readable and interesting. Keep up the good work.

Midland, Mich. S. B. HEATH

Likes It All

All parts of CHEMICAL INDUSTRIES are interesting and useful to me as my field is so broad (teaching and charge of research with the National Research Council).

Vienna, Va. PROF. HERBERT MOODY

"'Tops' With Me"

CHEMICAL INDUSTRIES is the top technical magazine with me. I have no suggestions that will improve its contents. My only regret is that my time does not permit a more thorough study of each issue.

Akron, Ohio. CLINTON O. MCNEER

Jobbers and the Patman Law

Whether Williams Haynes meant to give the impression that local chemical distributors have been helped by the Patman Law, he certainly failed to make clear how this law has changed their position and not altogether to their advantage.

It is true that the law forced producers to learn their selling costs and, since the expense of selling through local jobbers is much less than through the manufacturers' own staff, this has helped the jobber. On the other side of the ledger, many manufacturers have used this law as an excuse to cut down sales allowances to a uniform figure which they have taken as the least discount for quantity or smallest commission which they were paying to any distributor. All in all, this loss is greater than the gain, and in this otherwise fine review of the chemical selling organization, I do not find this clearly pointed out as it should be.

Cambridge, Mass. H. L. HOMES

We Started Something

There was an article in your March issue by Ernest Bridgwater which was very interesting. Would it be possible to secure two extra reprints of this article?

Philadelphia, Pa. J. W. CLEAVELAND,
Eastern Industrial Sales Mgr.,
Finishes Division,
E. I. du Pont de Nemours & Co.

We Hope He Feels the Same on 5-8-40

After reading a description of your journal, CHEMICAL INDUSTRIES in your form letter of date 5-8-39 I feel that I need to read this journal monthly.

Cambridge, Mass. EDWARD A. SPORT,
Manufacturing Chemists

Likes "Trade Gossip"

I think you do a pretty good job on the whole. I particularly like the "trade gossip" that you specialize in.

New York City. PROF. ARTHUR W. HIXSON,
Columbia University.

BON VOYAGE

A ship rolls lazily at anchor off the palm-fringed shores of a South Sea island. Happy-go-lucky natives place the branch of a tree atop the lighter of ore, signifying the last load of the cargo. Another shipment of Mutual chrome ore is about to start on its 40 day journey to the plants at Baltimore and Jersey City.

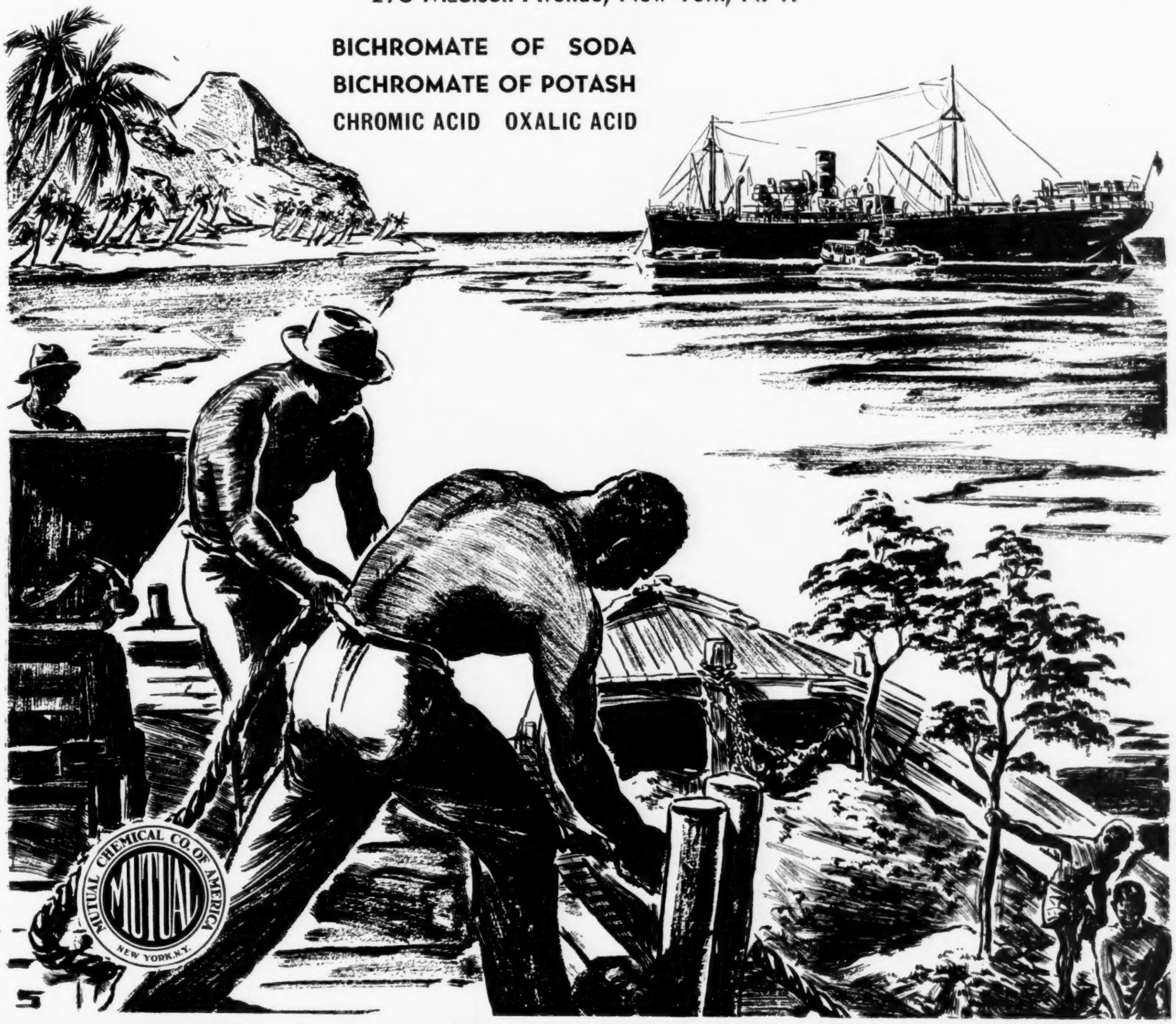
12,000 miles did not stop the Mutual Chemical Company from giving to American consumers a completely unified chromium chemical source of supply. We transported costly machinery across the Pacific and our mining engineers sacrifice years of their lives to work the world's richest chrome ore deposits.

These ore reserves in far off New Caledonia, plus large stocks of ore and finished products in plants and warehouses in the United States, give to users of chromium chemicals utmost protection against international uncertainties and unrest.

MUTUAL CHEMICAL CO. OF AMERICA

270 Madison Avenue, New York, N. Y.

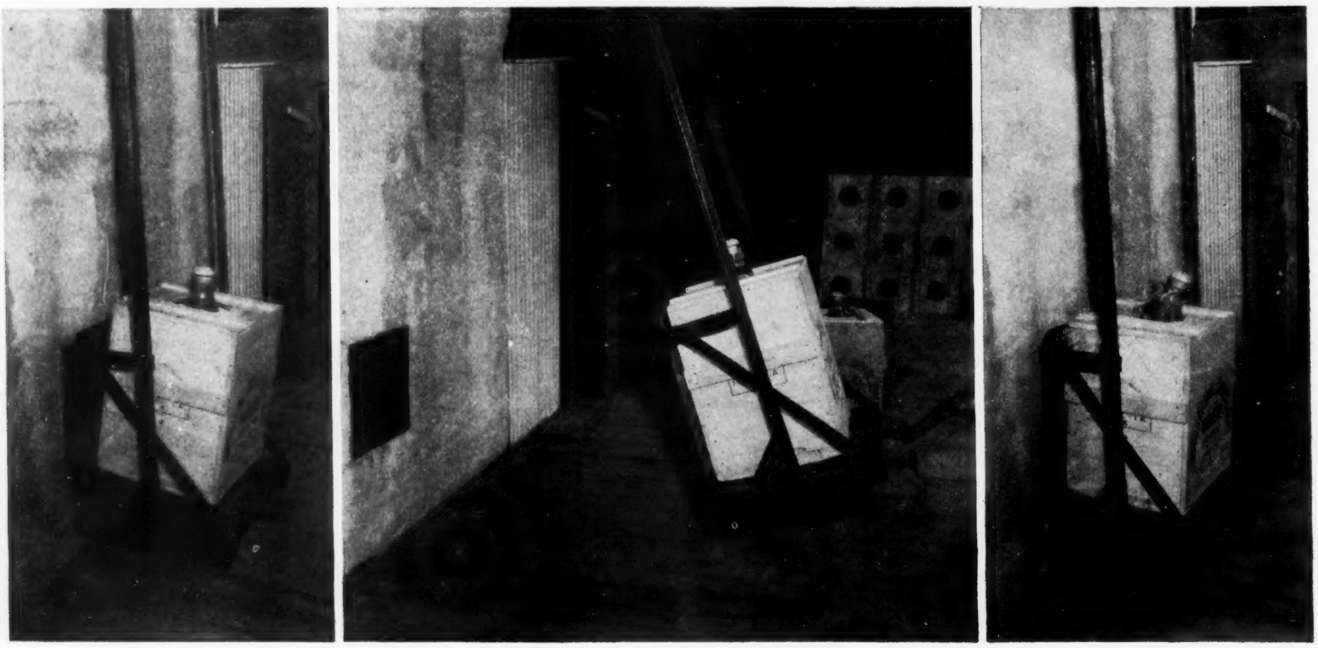
BICHROMATE OF SODA
BICHROMATE OF POTASH
CHROMIC ACID OXALIC ACID



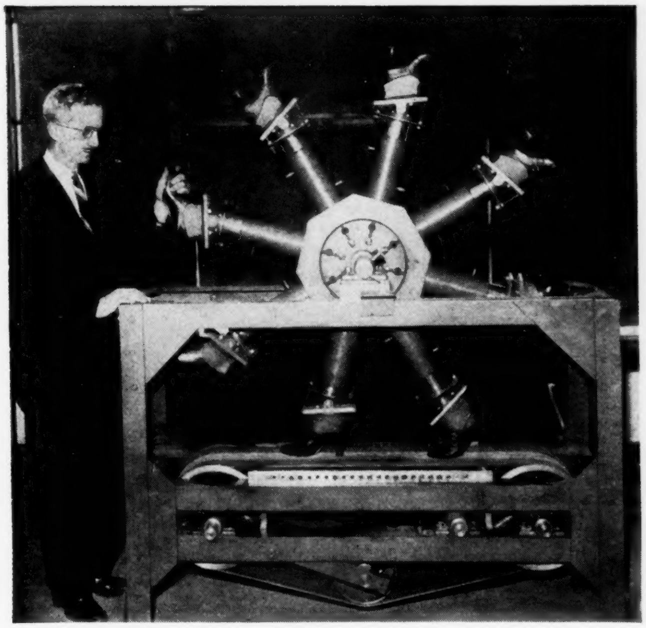
MUTUAL BICHROMATES

LIFE ON THE Chemical Newsfront

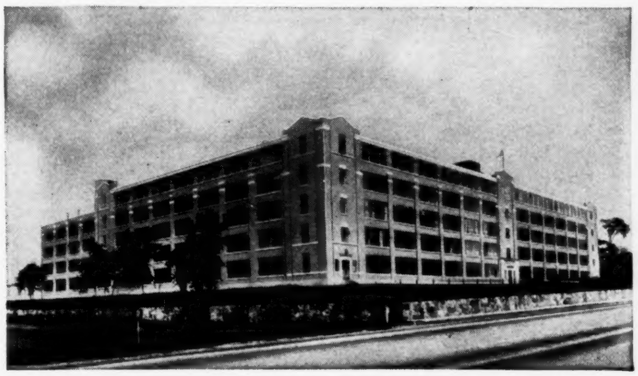
(*Above*) **"WORTH THEIR WEIGHT IN GOLD"** is an understatement for these tiny lenses of optical glass. They are so small that thousands of them can be held in the palm of the hand, but their cash value, weight for weight, exceeds even that of platinum. Not to be measured in dollars is the worth of optical glass to the chemical industry. With the aid of lenses like these, the chemist has brought to light the information hidden in the microscopic world. In his turn, the chemist supplies the raw materials needed in the delicate processes of manufacturing optical glass.



(*Above*) **"A CONTRIBUTION TO SAFETY"** is the comment of users of AERO Carboys and Packing, developed by American Cyanamid. Transportation of carboys used to be so hazardous that some years ago the Interstate Commerce Commission put into effect regulations decreeing that carboys must withstand a 55-inch swing on the apparatus illustrated above. This is regarded as a severe test, but AERO Carboys go far beyond this point in giving shippers several times the prescribed safety margin. Left to right, illustrations show AERO Carboy (picked at random from regular stock) just after taking in its stride the impact of a 105-inch swing (several times the impact of the 55-inch swing); being readied for the still greater shock of a 115-inch swing; and finally breaking after swinging through more than double the distance fixed by the I. C. C. Eight rubber blocks cushion the bottle—reduce the rebound from shock that used to cause plenty of breakages. Packing allows for safe rocking movement of bottle, yet prevents it from coming in contact with sides of box. Shims in corner grooves automatically position cushions on bottles—prevent human lapses in packing or reconditioning. Bottles are suspended at strongest points—upper and lower curves of shoulders. Big advantage of AERO Carboy is its combination of safety with low cost per trip. Box construction is rugged; rubber cushions are indestructible, can be reclaimed and used indefinitely. Folder giving construction details and recommended methods of packing is available on request.

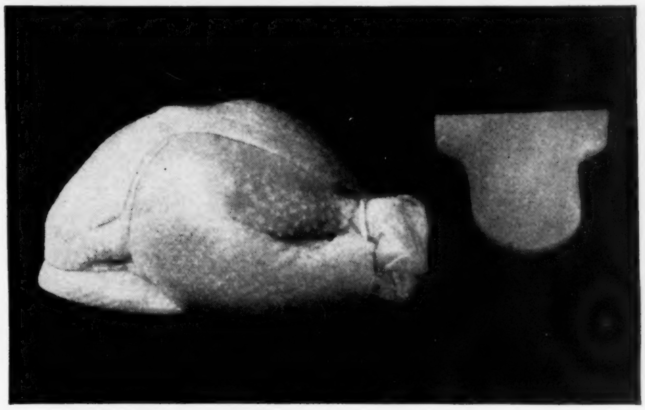


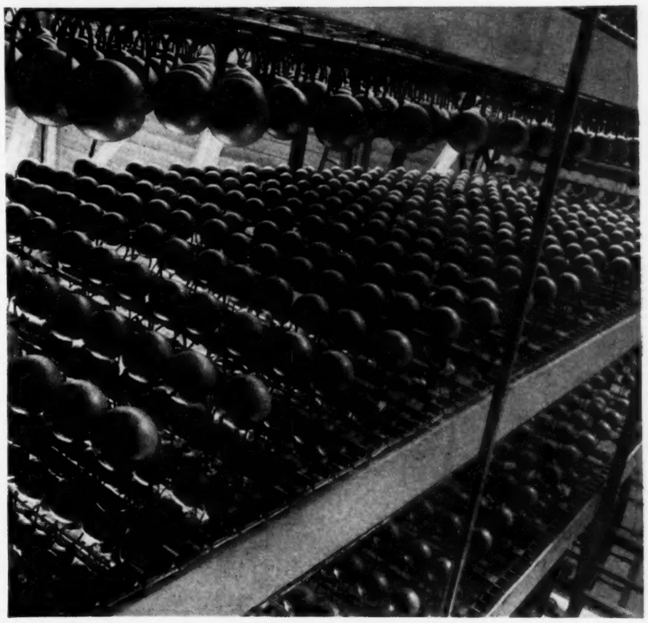
(Above) **MECHANICAL WALKER** at the Bureau of Standards puts shoes through their paces, testing their qualities by wearing them out at a rate that would destroy human feet faster than the shoes. Soles and uppers both take their share of punishment in this accelerated test, in which rotating wheel and endless belt simulate actual walking conditions, flexing the shoes at every step. Cyanamid's full line of leather chemicals and constant research in the leather field aid in the production of leathers that will constantly contribute to their greater usefulness and value.



(Above) **CENTER OF CHEMICAL PROGRESS** is the industry's research laboratories. In this fully equipped building at Stamford, Conn., the skilled researchers of American Cyanamid are constantly engaged in work that stimulates the development of the industries which Cyanamid serves. In addition to pure research work of a comprehensive character, the Cyanamid laboratories carry on research pointed toward the needs of specific divisions of the chemical industry. Sections of the laboratories are devoted to paper, ink, paint, leather, rubber, and textiles—and from these sections have come many new developments to aid the progress of industry.

(Below) **FOOD PRODUCTS IN RUBBER BAGS** keep their flavor longer, are protected from odor and contamination. Quick-freezing process is expected to benefit from the Cryo-Vac method of packing food products developed by Dewey & Almy Chemical Company. Rubber container is expanded, slipped over product to be protected, sealed, and contracted to form a transparent wrap. Bag is moisture- and vapor-proof, prevents evaporation of natural juices. Lustrous appearance of container increases eye appeal.





(Above) **TENNIS BALLS BY THE THOUSAND** are rolling through manufacturing plants, soon to join the ever-increasing numbers of their fellows that are being volleyed across courts all over the country. Far from the courts, research in the laboratories of the makers of tennis balls is playing its part in increasing the popularity of the sport. Here the tennis balls are shown at an intermediate stage of manufacture. The molded rubber centers have been covered with cement, and are ready for the application of the felt cover. Rubber and textiles are basic components of tennis balls—and Cyanamid chemicals contribute to the success of both these industries.

American Cyanamid & Chemical Corporation

30 ROCKEFELLER PLAZA, NEW YORK, N. Y.

"*But, darling, they* insist *that I go first—They say they've got only one net!*"

Write Your Own Specifications

and see how closely NATURAL *meets them!*

Compare the values of your "ideal" bichromate specifications with the figures from an actual analysis of our product. So much of this, not more than a certain per cent of that— and so on down the list. Item for item they will parallel.

There's a reason for this. Natural has set a high standard to achieve—and does it! May we send you samples?

Natural BICHROMATES

Natural Products Refining Co., 904 Garfield Ave., Jersey City, N. J.

CHEMICAL INDUSTRIES

The Chemical Business Magazine

Clean Water

LITTLE legislation before Congress this past session has been of wider concern yet attracted less general attention than the proposed laws for the control of stream pollution. Behind the scenes in Washington, however, S. 685, the Barkley Bill, has been a powerful magnet that has drawn both political and industrial forces into the swift and dangerous vortex of sectional interest. Accordingly, the bill as finally passed by the Senate on May first and reported out favorably by the House Rivers and Harbors Committee two weeks later, represents a number of important compromises. These are not at all pleasing to many. However, as we go to press, the bill appears likely to pass.

To the chemical industries this legislation is obviously of especial interest. Not only has the chemical plant been a frequent, favorite target for stream pollution criticism, but also clean water is one of the most important of all our chemical raw materials.

Despite the popular prejudice that senses in the very word "chemical" something poisonous, the hearings on the bill brought out quite clearly that these industries are not by any means the worst offenders in waste disposal. This is due chiefly to our lively interests in turning wastes into by-products and to the comparative ease of chemical, as compared with purely physical, methods of control and disposal. Indeed, contrary to the layman's belief, chemical manufacturing and especially chemical operations in processing fields, have been powerful influences for cleaning up our water supplies.

From the industrial point of view the Barkley Bill is sounder than some of its rivals in that it recognizes that water is an industrial raw material of prime importance and also that water after plant use must be returned to the streams. Plainly the problem of keeping the streams clean is not solely local or even intrastate; and the difficulty is to set up a co-operating and co-ordinating machinery between municipalities, states, and the federal authorities. It is at this point that opinion differs sharply and here the unsatisfying compromises have had to be made.

Williams Haynes, Editorial Director; Walter J. Murphy, Managing Editor; W. F. George, Advertising Manager; L. Chas. Todaro, Circulation Manager; John H. Burt, Production Manager.

"The Case for Licensing"

As president of the American Institute of Chemists, Dr. Robert J. Moore's address at their annual convention, held last month at the New York World's Fair, largely dealt with the professional angle of the question of licensing of chemists. This is quite understandable, for the primary purpose of the Institute is to foster and maintain the professional status of the chemist on a plane comparable to the lawyer and the physician.

Like every other problem, this one can, and is being approached from several different paths. Naturally the points of view of the chemists themselves, the politicians and law-makers, the public, and the employers of chemists will be colored more or less by personal motives.

Dr. Moore disposed of the bugaboo of "regimentation" by referring to the enthusiasm of the doctors, lawyers, and engineers for state licensing. Yet, in the minds of some at least, such fear is not entirely groundless and must be so recognized. Those who are demanding state or national medicine, or a combination of both, have injected the word "regimentation" into the idea of licensing for the public's protection. Prominent medical men have expressed this fear.

The interest of politicians and law-makers in licensing is pretty generally appreciated for what it is worth. Untapped sources of revenue are becoming increasingly more difficult to discover and the professed protection of a gullible public is only in many instances a smokescreen for more political revenue. Yet, certainly there is some need for state regulation governing the use of the professional term, chemist, in order to protect the public and small employers who largely depend upon outside consultants. This need is somewhat weakened by the fact that chemists are not called upon to serve in emergencies as are doctors and "John Doe" has, therefore, plenty of opportunity to investigate the professional standing of a consultant chemist before engaging him.

Dr. Moore stated bluntly that "There seems to be no valid argument against the licensing of professional chemists who hold themselves out as such to the public, the employer, and the state." He added that there was much to be said for the state licensing of all chemists, but we all know that this is the very core of the argument.

The practical difficulty of defining "a chemist" in fair, adequate terms of professional competency is great. No simple, board of examination questions would reveal even elementary knowledge required by the chemists in, for example, the foodstuffs or dyestuffs, the steel or rubber, the medicinal or industrial fields.

An Enlightened Program

The officers of the Salesmen's Association of the American Chemical Industry are to be congratulated for their initiative and foresight in formulating a constructive educational program for the members in connection with the luncheon meetings and the members likewise are to be highly commended for the excellent manner in which they have so far responded. CHEMICAL INDUSTRIES feels honored to be able to present in this issue Dr. Edward M. Frankel's address at the May meeting of the Salesmen's group on "Chemicals in the Paper and Pulp Industry"—the first in the series planned on the general subject "Chemicals and the Purposes for Which They Are Used in Key Industries."

The publication in our March issue of Ernest Bridgwater's paper before the New York Chapter of the American Institute of Chemists on the subject "Should Chemical Salesmen Be Technically Trained" has provoked considerable constructive thinking and discussion. It has been said that "A little knowledge is a dangerous thing"—yet the acquiring of knowledge whether done individually or collectively must be done step by step and the present program of the Salesmen's Association is most certainly a step in the right direction.

Chemical Labor Record

Few within the chemical industry could quote such exact figures to substantiate the statement that the chemical industry has been relatively free of labor trouble as did Henry G. Baker, Jr., at the recent Akron meeting of the American Institute of Chemical Engineers. Yet, this enviable record is hardly "news."

From the public relations angle, however, a statement from a member of the United States Conciliation Service that about one per cent. of the 4,231 cases handled by the Service between July 1937 and July 1938 were classified industrially as chemical, is of distinct value and should be publicized, as should also Mr. Baker's statement that "The chemical industry ranks far down the list of industries with labor difficulties, and should command the respect of everyone for its record in promoting and maintaining industrial peace."

New Lamps for Old

New Products for Old Industries

By Williams Haynes

For the expansion and rejuvenation of old industries nothing today offers so splendid an opportunity as do the new synthetic chemical materials. This thought was developed at the summer meeting of the New England Council and out of it has sprung a unique collaboration by the three foremost chemical consulting organizations in New England, Gustavus J. Esselen, Inc., Arthur D. Little, Inc., and Skinner & Sherman, Inc., who are co-operatively writing six articles showing specifically how synthetic fibres, the new coatings, plastics, colors, rubber substitutes, and alloys are being employed today to make new goods and better goods and cheaper goods that open up new markets for old manufacturers. Following is an introduction to this series showing how and why these new synthetic chemical materials, backed by research, revolutionize all industry and create new opportunities.

"NEW lamps for old! New lamps for old!!" Through the narrow, crooked streets of old Bagdad this strange cry echoed. "New lamps for old."

Whoever heard of such an offer? Not knowing Aladdin's secret of the genii of the antique lamp, the good housewives believed that he was surely daft. New lamps for old, indeed. They flocked to make the crazy barter.

Fertilizers made out of the air! Soapless soap! Alcohol—real ethyl alcohol that burns with a blue flame and will make a man tipsy—alcohol made out of black, oily petroleum. A better varnish made without varnish gums and a finer filament than the spider's web sold cheaper than silk! Substitutes for rubber and ivory. Synthetics that duplicate the products of the camphor tree, the indigo plant, the vanilla bean. Iceless ice! Crazy chemical notions these; undreamed of substances with novel properties and unexpected uses; new materials offering our industries opportunities to improve their products and to sell them profitably at lower prices.

New lamps for old! Is it any wonder that the housewives of today flock to buy these better, cheaper wares?

More goods, better and cheaper—that is the Aladdin's secret of modern industry. It is genii even more powerful than the mythical slave of his old bronze lamp. It is our modern economic miracle, made possible through research and made practical for alert manufacturers through the new products of the chemical industries.

Last winter twoscore of leaders in the textile field sat down with chemical and rayon experts under the friendly auspices of the New England Council to consider synthetic fibres. Naturally the very newest of these, synthetic wools of various types, came into the discussion; and an experienced worsted maker, who had been doing some experimenting with them, summarized his investigations:

"They look like wool. They even feel pretty much like wool. But they don't spin, or dye, or weave, or wear like wool! They will never be anything but cheap substitutes for wool."

"Cheaper than today they will certainly be, but they are not substitutes and never will be. They are new types of fibres; brand new textile materials."

That optimistic, defiant correction was made, not by a chemist, not by a synthetic fibre maker, but by a textile executive in the mill which has scored a conspicuous, profitable success in manufacturing and marketing various Palm Beach type of suitings materials. He drove his point home with these prophetic words:

"It is completely wrong to look upon these new synthetic fibres as cheap and nasty substitutes. They are new raw materials that enable us to make new finished goods. We are today making several new kinds of light-weight fabrics that the public has accepted as the finest materials for summer suitings, and not one of those fabrics would be possible were it not for these new synthetics. I dare to boast that these new fabrics are better for men's summer clothing than the finest of the lightweight worsteds. We will make them better yet and we are now making them to sell at from eight to fifteen dollars a suit against from twenty-five to forty dollars for a ready-made suit of the older fabrics. Some day we shall make winter suitings better than tweeds and heavy-weight worsteds; and they will sell for from eight to fifteen dollars.

"As we see it, we must go out to sell a man four suits a year for ten dollars each, instead of two suits at twenty-five. This is a radical change in textile philosophy; but it means twice as many yards of cloth, twice as many spindles and looms, twice as much mill labor and twice as much tailoring. And I am willing to bet that the tailors will think up some changes in the cut of a lapel that will make a man ashamed to wear a ten-dollar-suit for four years even if the materials don't wear out for six!"

Sell twice as many goods because they are better and cost the consumer less, yet because of greater output and lower cost raw materials the manufacturer earns as satisfactory profits.

Aladdin's secret?—it is the secret of the automobile industry; season after season, better cars and lower prices. It is the secret, too, of that other ultra-modern American industry, the makers of our chemical products, who steadily since 1929 have increased their output and decreased their prices, offering to all manufacturers new and improved materials.

These new chemical materials go now into every industry. If your raw materials are cotton or linen, wool or silk, wood or iron, rubber or marble, concrete or diamonds, watch these new synthetics. They can help you into new products and bigger markets. They may hurt you as dangerous competitors. For more and more the fiercest competition of today is not between companies and goods: it is between industries and materials.

Can you conjure up in your mind's eye an entirely new material, such a substance as no man has ever touched, or tasted, or even dreamed of before? Even to imagine such a material is not easy. Yet actually to create hitherto unknown substances is regularly the task of the research chemist.

Literally hundreds of thousands of such brand new products have been made in the laboratory. Millions upon millions of them are theoretically possible by new recombinations of the chemical elements. Already many thousands of these unique materials have been put together, first in the research laboratory, later to be made in commercial quantities in our chemical plants. Hundreds of them have become articles of daily use familiar to us all. Rayon, Bakelite, most of the coaltar dyes, the new wonder-drug sulfanilimide, the rubber substitute neoprene, these and many many others, all are true synthetics, chemical products of the laboratory, never found in Nature.

Only quite recently a whole group of new substances, the nitrated paraffins, have been developed. Such new materials naturally have quite novel chemical and physical characteristics, and Industry and Science are busily at work developing all sorts of new uses for them. In many ways this search for uses for new materials is easier than it is to discover new uses for old materials. This, however, is the other great task of modern chemical research applied directly to the businessman's problems.

6 Million Lbs. of Olive Oil

New uses for old materials do not create as much stir, yet the industrialist needs to look out for them constantly. Within the month, right here in New England, we have had a pretty example of how research finds fresh employment for a familiar chemical that concerns every woolen manufacturer and may well chop off six million pounds from our olive oil imports from Spain and Italy.

Di-potassium phosphate is a simple, inorganic chemical salt. Its half-brother, potassium phosphate, has been produced and used in a limited way as an ingredient in highly concentrated fertilizers; but the di-salt is not itself even listed in "The Chemical Buyer's Guidebook" and certainly it is not a common item of chemical trade. Research is apt to change all this, for research has discovered that di-potassium phosphate is able not only to speed up the process of wool spinning, but also to improve the feel and wear of worsted goods. Quicker and better! That is a worthwhile improvement.

Raw wool is almost unbelievably dirty and must be washed before spinning. This cleansing operation removes the natural wool grease, which, of course, is salvaged and sold as lanolin, the basis of many face creams. Still it is necessary again to "lubricate" the wool fibres before spinning. For this purpose we have imported olive oil—6,000,000 lbs.—but it appears that now di-potassium phosphate, made in America, will do this lubricating job for us. And because it rinses out quite simply in cool water, it will not mat and harshen the delicate wool fibres as happens in the vigorous soap scrubbing necessary to remove olive oil.

While new applications of old chemical products may in this way quite suddenly become a factor in any manufacturer's business, nevertheless, it is the sensational progress of the new synthetic materials that today attracts our attention. We have all of us stretched out the meaning of that good old scientific term 'synthetic' to cover a lot of chemical products. Accordingly, if we are hunting about to learn how these new materials and processes may be applied to our own business problems, it may be smart to consider just what these are, as well as what are their peculiar advantages, and how they may be fitted into any manufacturing operation.

What Is "Synthetic"?

These new synthetics really belong in two different classes:

1—True synthetics, that is, exact chemical duplicates made in the chemical plant, but literally the same chemical composition as natural materials. Among these are indigotine, the coloring principle of the indigo plant, and acetic acid produced from coke and limestone rather than from vinegar.

2—Acceptable substitutes, that is, chemical products quite unlike their natural rivals from the chemical point of view, but able to take their place in industrial uses. In this group we find most of the artificial perfumes, the so-called synthetic resins, the rubber substitutes.

This second group is not only much more numerous, but it is also much more interesting and valuable to the manufacturer, for here are the materials which possess unique characteristics. Celluloid, grand-daddy of all artificial plastics, can be produced so that it simulates ivory perfectly; but it is an ivory that never cracks or turns yellow with age. Rubber is attacked by oils, gasoline, and most chemicals; but several rubber substitutes are quite impervious to these reagents. Accordingly, all gas station hoses are now made of them rather than of the natural rubber.

Some two hundred distinct synthetic resins are now available for the choice of the makers of lacquers and other coatings. They have different melting points. They dissolve in different proportions in different solvents. They react differently with a score of different plasticizers, those substances that impart to the lacquer film its smoothness, its flexibility, its adhesive qualities. The result is that our lacquer makers are able skillfully to formulate a wide variety of special coatings

each one definitely designed to meet specific conditions or particular requirements. Thus we have special coatings for the hull of a ship and the handle of baby's rattle, and although the outside and the inside of the modern refrigerator appear to be the same smooth white enamelled surface, the coatings used are quite different because the conditions under which each must render good service are quite different. Any manufacturer who is protecting or decorating any surface or any material from steel to silk, who does not keep posted on coatings progress is almost certain to be out of date.

This high specialization made possible by these new synthetic materials is their most distinguished service to the manufacturing industries of the country. Just because they are man-made materials, which can be controlled and modified, these synthetic products can be made-to-order to fill the most exacting demands of civilized man. More durable goods, more perfectly adapted to their purposes, more pleasing, more comfortable, more safe—all these benefits of specialization mean simply better goods for the consumer. They are goods easier to sell. They give more lasting satisfaction to the purchaser. But besides being better these new chemical materials from the businessman's point of view all possess three big, basic advantages over the natural raw materials. Always they are uniform in quality enabling a manufacturer thoroughly to standardize his processes and operations. They are available in steady supply at stable prices. As time goes on quality becomes higher while price tends lower.

Within the past year research has discovered a useful employment for plentiful waste material, and the story behind this development illustrates most aptly the battle between the land and the laboratory to supply mankind's needs.

Gold and Two Beans

When Cortez conquered Mexico he found not only Aztec treasure but also two valuable beans, the cacao and the vanilla. The first gives us chocolate: the latter is the most widely used flavoring material. The vanilla bean grows on a vine that reaches maturity in three years and after eight years fails to yield profitable crops. Each season the vines must be skillfully trimmed and young stock grown on to replace outworked plants Although Mexico still produces the beans of the finest flavor, still vanilla is cultivated in many parts of the semi-tropics and the French island of Madagascar is the most important commercial source.

In 1875, two chemists—one in France and the other in Germany—simultaneously, but independently, patented two different processes for the manufacture of vanillin, chemically identical with the vanillin which is the active flavoring principle of the natural bean. Within the year, synthetic vanillin appeared on the market at $80 a pound. Fifty years later the price was $8.

Just at this time, in 1924, a revolution in Mexico and crop failures due to bad weather in other growing centers, gave the Madagascar planters a corner on the market. Natural causes beyond man's control that so often seriously affect the prices of natural commodities came into play and the Madagascar vanilla growers fell prey to a most elementary human temptation. Having a neat little natural monopoly they ran the price up from $1 to $9 a lb. This price is, of course, for "Whole beans" from which the flavoring material must be extracted with alcohol.

Now the $9 quotation stimulated vanilla planters all over the world to extend their plantations, so that the output of natural beans was steadily increased during the next three years. But that same $9 price encouraged a lot of makers of cakes and candies and ice cream to substitute vanillin for "true vanilla extract," hence the demand for beans was markedly cut down. By 1927 the natural crop had doubled. By 1932 the price had dropped to 50c.

$80 per Lb. Reduced to $2.10

In the meantime, however, the manufacturers of synthetic vanillin, thanks to the greater demand had increased their outputs and so cut down further their production costs, and they had reduced their price to $4, or half of what it had been when the famine created the Madagascar monopoly in 1924. Today, the price of vanillin is quoted at $2.10, another reduction almost by half. Till last year vanillin has been made by processes that trace back to those two original patents granted seventy years ago; but research carried on by a paper manufacturer to find a use for the quantities of lignin that are produced willy-nilly as a waste in making of wood pulp, discovered a new process for turning it into the flavoring principle of the famous Mexican bean.

Any alert industrialist can write half a dozen neat little mottoes to cap the fabulous story of vanillin. It is a story of direct competition in identical products between land and laboratory; but today to most manufacturers the unique chemical materials, not found in Nature, present the greatest opportunities. New lamps for old!

It is said that American styles and American materials lead all the world in women's sportswear. *Life* pre-viewed this summer season in eleven pages of photographs posing stunning models in slacks and shorts and bathing suits, and announced the surprising fact that 75 per cent. of the materials used are wholly or in part synthetic fibres. This most modernistic section of the clothing industry sells more than $200,000,000 worth of sports apparel to American women. Wear and tear; exposure to summer sun and icy glare; to salt water, melting snow, perspiration; sent time and time to laundry and dry cleaner, these sports clothes must indeed meet acid tests. And 75 per cent. of fabrics used are synthetic. That is an astonishing fact—and an exceedingly significant one.

The Chemist's Contribution to the Pharmaceutical Industry*

By Joseph Ebert

President, Farastan Company

Not until we ourselves or someone close to us is seriously ill do we fully appreciate the importance of the pharmaceutical chemist indomitably struggling against tremendous odds to provide fellow-beings with products that aid in diagnosis and help in the cure of human ills. Dr. Ebert, one of the country's outstanding pharmaceutical chemists, reviews the developments in this branch of chemistry from early times down to the announcement of sulfapyridine in 1938, and gives an insight into the difficulties encountered in the introduction of any new preparation.

WHAT is pharmaceutical chemistry? It is that branch of chemistry that is engaged in the development of natural and synthetic products for the diagnosis or the cure or the prevention or the mitigation of human and animal ills.

The materials used in pharmaceutical chemistry may be members of the vegetable or the animal or the mineral kingdom, or else they may be synthetically made. Up to the arrival of the synthetic era in chemistry, pharmacy and medicine depended entirely on the first three classifications. We all know that members of the botanical family, such as Cinchona bark, cascara bark, rhubarb root, absynth leaves, camphor gum and an army of other barks, roots, flowers, herbs, gums, etc., have been made and are still being made into tinctures, fluid extracts, elixirs, pills, pastes, liniments, or ointments. Various members of the vegetable kingdom served as the starting materials for a number of alkaloids, such as opium, the dried juice of the *Papaver somniferum* for the making of morphine, codein, or the Cinchona bark for the alkaloids of the quinine family, the chocolate bean for theobromine, coffee beans and tea leaves for caffeine, digitalis for the glucosides, digitalin, digitonin, digitoxin, etc.

The animal kingdom supplies many of the fats and oils widely used, externally as well as internally, in pharmacy and medicine. Adeps or lard has served for centuries as the base or the carrier of medicaments in ointments. Lanolin (wool fat), the purified fat of sheep wool, serves the same purpose. Fats or greases from various animals, such as the fox, the dog, the goose, etc., have been employed, externally and internally, for a number of diseases ranging from the treatment of a boil to the cure of tuberculosis. In many sections they are still important "folk remedies." We all remember when in our childhood mother used to force a teaspoonful of cod liver oil down our rebellious throat. In those days this important product of the fresh livers of the *Gadus morrhua* was given for general, mostly undetermined, principles. Today we take it, in concentrated form, in a palatable tablet for its vitamin content. Liver extract for anemia and insulin for diabetes are other important members of this family. For the past few years, vitamins, hormones and glandular products have become the most conspicuous products derived from the animal kingdom.

We are all aware of the many compounds that the mineral kingdom has furnished to pharmaceutical and medicinal chemistry. There is hardly an element in the periodic system that has not been used for medicinal purposes. Chlorine, bromine and iodine, in inorganic and organic combination, are highly important; iron, in metallic form (as reduced iron) as well as in the form of many inorganic and organic compounds, is still the old standby in anemic conditions or as a general tonic. In recent years copper has been given in conjunction with iron, since at the University of Wisconsin it was found that small amounts of copper had a catalytic effect on the absorption of iron. Bismuth compounds are widely used internally for intestinal disorders or externally for the treatment of some skin afflictions. For the past ten years bismuth salts have also been employed in the treatment of syphilis. Arsenic and mercury are reputed to be the oldest members of the mineral family, having been used medically in old Egypt and Rome. We all know of their importance in pharmaceutical chemistry today; arsenic being a constituent of arsphenamine (606) and mercury being used in many forms, externally as well as internally. Calcium, magnesium and aluminum salts are used in ton lots every year for pharmaceutical purposes, ranging from their use in toothpowder or toothpaste to the treatment of gastric hyperacidity and stomach ulcer.

While I have treated the vegetable, animal and mineral kingdoms as independent supply sources for pharmaceutical and medicinal chemistry, they are actually closely interwoven with the field of synthetic chemistry insofar as many of these products are serving as starting materials or intermediates in the synthetic field. This field, undoubtedly, is today the most important branch of pharmaceutical chemistry. It can be safely stated that the beginning of synthetic pharmaceutical

*Paper delivered before N. Y. Chapter, American Institute of Chemists, April 28, at the Chemists' Club (N. Y.)

chemistry dates back to the year 1874, when Kolbe, in Germany, gave us a synthetic process for the manufacture of salicylic acid. As long as we consider the synthesis of salicylic acid as the threshold of synthetic pharmaceutical chemistry, let us review the story preceding the year 1874.

Discovery of Salicyl Aldehyde

In 1834, salicyl aldehyde (the so-called salicylous acid) was discovered by Pagenstecher in the flowers of *Spirea Ulmaria,* a shrub cultivated for its handsome flowers (*rosaceae*). In 1837, it was found that oxidizing agents would convert this aldehyde into salicylic acid. However, in 1843, Procter discovered that the acid could be made from oil of wintergreen, which contains more than 95% methyl salicylate. This compound was treated with potassium hydroxide and the potassium salicylate was obtained. This salt was used for a number of years in all indications in which today sodium salicylate is employed. However, potassium salicylate being rather expensive, the use of salicylates did not become general until Kolbe, in 1874, made salicylic acid available synthetically.

In surveying the field of synthetic pharmaceutical chemistry from the year 1874 on, we cannot help being impressed by the fact that from then on, until the earlier part of this century, the chemist concentrated his efforts on the development of analgesics. This, no doubt, was chiefly due to the fact that the biological functions of the body were then comparatively little explored and that, therefore, the chemist, instead of striking at the cause of the disease, was satisfied to eliminate the pain, prompted by the thesis of the medical men of the eighteenth century; "rid the patient from pain and nature and the doctor will be much better able to cure the patient."

Many derivatives of salicylic acid were created. Most of them were discarded and forgotten until, in 1899, aspirin (acetyl salicylic acid) was born. The importance and popularity of this compound is borne out by the fact that its consumption in this country in 1937 (the latest statistics available) amounted to approximately three and one-third million pounds. This is a big figure for any pharmaceutical compound. Converted into five-grain tablets, this would yield approximately 4,950,000,000 tablets and this converted into boxes of twelve tablets each would give 412,500,000 boxes; or, figured in terms of the population of this country—120,000,000 people—each inhabitant would have taken forty-one tablets, each five-grain, of aspirin in 1937. There are no figures available as to how many of these tablets were consumed by the business men of this country who have had reputedly one headache after another for several years.

Between the discovery of salicylic acid in 1874 and of aspirin in 1899, two independent series of analgesics were developed. One series, derived from aniline, is represented by acetanilid (1885) and phenacetin (acetphenetidin) in 1887. Both are still widely used; acetanilid is a constituent of Bromo-Seltzer. The other series, derivatives of pyrazolon, is represented by antipyrin (1884) and amidopyrin, a little later. Both compounds have been quite popular with the medical profession until recently, when they were found to cause—in certain cases—an undesirable and dangerous change in the blood picture, agranulocytosis and leukopenia. Another series, members of the quinoline family, is led by atophan (cinchophen) which was introduced into medicine in 1910 and which, together with some derivatives, has established quite a reputation as an analgesic in certain types of arthritis and also in gouty conditions, due to its effect on the excretion of urates.

The most important pharmaceutical products synthesized in the earlier part of this century (in 1905) is the veronal or barbital family and salvarsan (arsphenamine) by Ehrlich in 1906. The barbitals belong to the class of soporifics or sleep producers. In this series, phenobarbital is particularly well known.

The discovery of salvarsan by Ehrlich has been considered a milestone in chemotherapy since, together with its congener, neo-salvarsan, it has proven to be the long looked for specific treatment in spirochetic or syphilitic conditions. The excitement and the enthusiasm caused by the discovery of salvarsan was not duplicated until 1937 when sulfanilamide, the specific for streptococcus infections, had its first clinical trial in this country, to be followed in 1938 by sulfapyridine, the specific for pneumococcus infections.

Another important development of the earlier part of this century was novocain or procain (in 1908), the local anesthetic so well known to everybody from his visits to the dentist.

The Effect of the World War

While up to 1914, the beginning of the World War, the Germans and the French were looked upon as the pioneers in synthetic pharmaceutical chemistry, the beginning of the war with its suddenly interrupted importation served as a stimulus to the American chemist to attack the synthesis of pharmaceuticals. Soon laboratories and factories in this country were able to furnish to the medical profession and to the suffering public the needed compounds. Today, a little more than twenty years after the conclusion of the war, our pharmaceutical industry is not only independent of foreign imports but we are also exporting substantial quantities to practically every corner of the earth. Millions of dollars are being invested in pharmaceutical manufacturing and millions of dollars are being spent every year in research for the improvement of old and the development of new products. As a result, many important and new compounds have been evolved in practically every line of medicinal chemistry, such as new barbituric acid derivatives of superior therapeutic action, new antiseptics, namely metaphen, merthiolate,

mercurochrome, new pressor agents, new local anesthetics, vitamin preparations, etc.

However, much work is yet to be done. Research in pharmaceutical chemistry cannot afford to let down. The medical profession and the public are looking to the research mind of the chemist for the solution of many, many problems; will the chemist find a cure for cancer, for tuberculosis, for arthritis—just to name only a few of the most pressing problems? Will the chemist find the ideal internal antiseptic, the ideal agent for regulation of blood pressure and circulation? The field of vitamins, hormones and glandular products has to be further explored, and so on. The opportunities for the research man, and, of course, later on for the production man, in pharmaceutical chemistry are tremendous. What are the ideal requirements for a pharmaceutical chemist? He should have a thorough knowledge of inorganic and, particularly, organic chemistry. In order to enable him to select his reseach program intelligently, he should have a good conception of the pharmacology of chemical compounds and individual groups and radicals. He should acquaint himself with the biological functions of human and animal life. He must, at all times, be willing to cooperate with the pharmacologist, the pathologist and the clinician because without their assistance his work could never lead to any feasible and practical results.

Synthesis But The First Step

If the work of the pharmaceutical research man were completed with the synthesis of a new compound, everything would be satisfactory. However, this work is only the first milestone to success or failure. After he has convinced himself, by painstaking chemical and physical methods, of the identity and the purity of his new compound, the pharmacological laboratory enters into the picture. There, the toxicity of the compound is to be determined on mice or rats or both, oftentimes larger animals have to be employed; the minimum lethal dose will be established and on the basis of this a safe dosage for men will be calculated. The histologist and pathologist will examine the vital organs of the autopsied animals to find out whether or not some damage was caused by the compound. In some cases, the animal work will throw some preliminary light on the therapeutic action of the compound. Hundreds of animals and oftentimes more have to be studied to enable the pharmacologist and pathologist to draw some definite conclusions as to the absence of toxicity and the safety of the compound for man.

Only then is the new chemical ready for the clinician for his experimental work on human beings. Outside of his study of the therapeutic effect, he will carefully observe the occurrence of side reactions, such as the effect on the stomach, etc. Only after several hundred cases—the more the better—have been studied, preferably by several independent investigators, are you in a position to arrive at a definite judgment as to the therapeutic value and to the safety of your new development. Quite naturally, the animal and clinical work in many instances leads to considerable headaches and heartaches. A compound which, from its chemical structure may look highly promising, may prove in its tests on animals too toxic for human consumption and a compound, which has shown up very encouragingly in the animal work, may in the human work not show the therapeutic effect expected which automatically means that perhaps months and months of chemical laboratory work have been nullified. It is exactly this point that makes pharmaceutical development work a rather hazardous and expensive proposition. I have seen instances where a new compound was developed in the laboratory in two or three months but during the animal and clinical work so many complications turned up that this phase of work could not be concluded before a year or more. On the other hand, it took a chemist, to develop a certain product in the laboratory, two years, and in about three weeks of animal study the inadvisability of proceeding with the work for a number of well founded reasons became apparent.

However, in spite of all the adversities and disappointments connected with his work, the pharmaceutical chemist must educate himself to be an idealist; he must always keep in mind that the medical profession and the public look to him for the weapons to successfully combat disease and cure ills. He should pursue his work with the same zeal and idealism as many great chemists and pharmacologists in the history of chemistry and medicine did before him, such as Ehrlich, Berger, Banting, Abel and others.

Acetic Acid Process

Acetic acid and/or methyl acetate is produced by reacting methyl alcohol with carbon monoxide in presence of a nitrogen compound of a phosphorus oxy-acid dispersed in the reaction zone. Suitable catalysts are an ammonium or substituted ammonium (*e.g.*, pyridinium) salt of a phosphorus oxyacid, or a partially amidated phosphorus oxyacid or ester thereof or a fully amidated phosphorus oxyacid. E. P. 490,544, described in *Chemical Trade Journal*, Nov. 11, '38, p. 455, states that the catalyst may be used in the form of vapor, or if not easily volatile may be injected as a solution for instance in water, acetic acid or methyl alcohol. The production of free acetic acid is favored by the presence of water vapor. Methyl acetate and any dimethyl ether that may be produced may be returned to the reaction vessel. The reaction temperature may be 250—450° C. and the reaction may be effected in a tube containing a filling of copper turnings or gauze to which a silver compound has been applied or which is plated with silver on a part of the surface, since traces of copper and silver compounds facilitate the reaction. E.P. 283,989 is referred to.

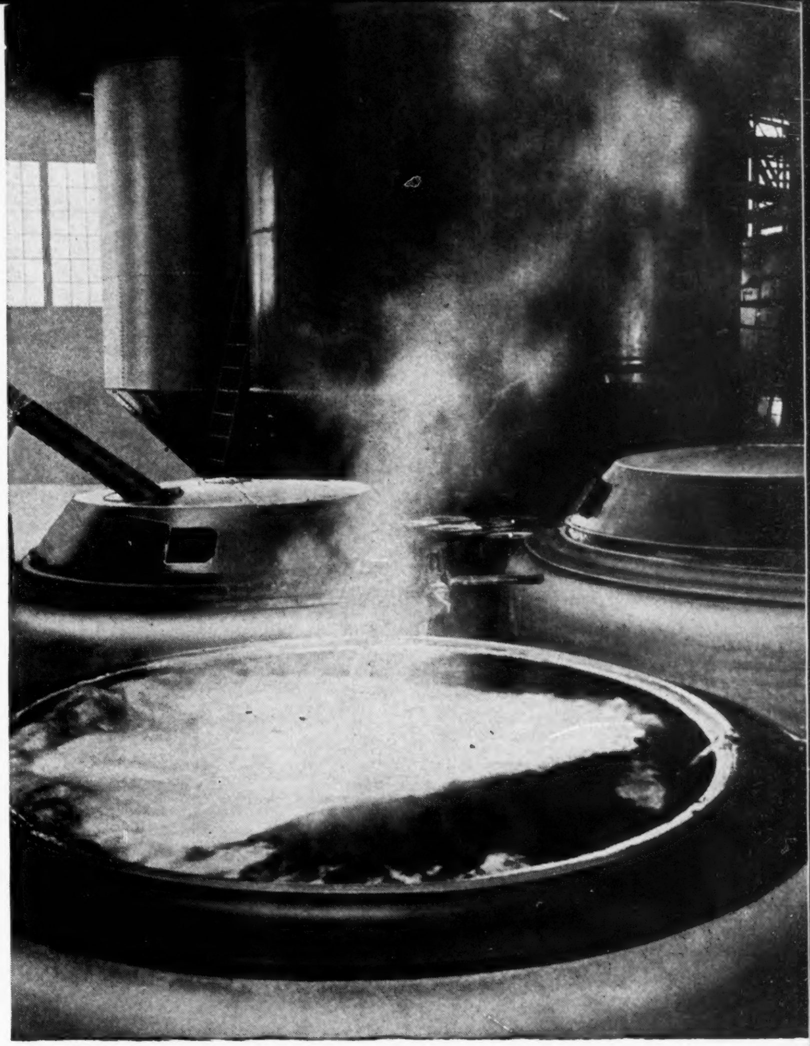
Commercial Explosives

Information Circular 7046, "Safe Storage, Handling, and Use of Commercial Explosives," is available from the Bureau of Mines, Washington, D. C. Types of explosives suitable for underground use, the hazards to health and safety they create, and some of the procedures to eliminate these hazards are discussed.

CHEMICALS

in the Paper and Pulp Industry

By Edward M. Frankel



Caustic Soda Tanks in a Paper Mill

The Chemical Salesmen's Association of the American Chemical Industry, alert to the problems confronting the chemical salesman today, including the necessity of having at least some technical background of the various consuming industries he is selling, has arranged for a series of speakers to address its luncheon meetings to discuss the use of chemicals in such representative consuming fields as rubber, textile, leather, coatings, ceramics, etc. The first was held at the Chemists' Club, New York City, on May 10, with Dr. Edward M. Frankel, consultant for the West Virginia Pulp & Paper Company, as the speaker discussing the paper and pulp chemicals.

OUR customers may be interested in the chemical product for its chemical or its physical properties. If a man requires turpentine to make synthetic camphor, he is interested in the material as a source of alpha pinene, so that there is nothing you can substitute for it. If, on the other hand, he requires turpentine as a solvent, almost any other solvent of equivalent or better properties can be substituted. With this in mind, the sale of chemicals to the paper industry constitutes a sale for the greatest part of chemicals for mechanical use, as opposed to strictly chemical use.

The paper industry, having gross sales of $1,500,000,000 per year is a fair cross section of what we find in all industry, so its chemical needs should prove of interest. Within the paper industry we have three general types of product, based on the principal raw materials. First, mechanical papers such as ground wood papers, rice and straw papers, rag papers, and re-worked papers. These are, for the largest part, produced without the aid of any chemicals, since the fibers that go into them are useful in the form in which they exist in the original wood, grass, or rags, or in the pulp to be derived by re-working old stock. Here the process consists of reducing a stick of wood by grinding on a stone, or by other mechanical treatment such as brushing out of grasses or rags, the re-pulping by simple wetting and brushing of fibers that had previously been used as papers. The field for these papers is very large, the bulk of our news print coming in this class. Curiously, our finest papers, such as Japanese rice paper and rag papers, also fall in the same category. In the re-worked papers, the largest production goes into so-called chip board, used principally for small cartons. Here the raw material consists mainly of old papers assembled by various secondary-materials merchants.

To this class of papers makers, the chemical trade has little to offer. They purchase small quantities of alkalies, which assist in the repulping operations but which act principally as detergents for removing dirt and printing ink. In news print, the only serious contribution made by the chemical industry has been the introduction of zinc hydro-sulfite, a useful bleaching agent in certain areas.

The big field for chemicals lies in the other types of paper. A word concerning the difference between chemical and mechanical pulp: the original plant fiber consists of a substantial proportion of cellulose and a certain amount of encrusting substances, hemi-celluloses, lignin, color bodies, etc. Certain fibers, such as linen and cotton, contain relatively large proportions of cellulose, whereas in the grasses these proportions are reduced, and finally in the woody fibers, (spruce, poplar, pine, etc.), the percentage of useful cellulose is not more than about 60%. Broadly, the more refined the cellulose is, the longer will be the life of the paper. For

paper used in documents designed to have a long life, we prefer cotton or linen fibers derived from rags. Where paper is to have a moderate life, say to fifty years, purified chemical pulps are employed. Where the paper is intended for a wrapping, when its life will need to be not more than a year, less purified chemical pulps, such as kraft, are successfully employed. Paper useful for but a day or two, as in the case of a newspaper, is made of ground wood, together with some chemical pulp for binding purposes.

Heavy Consumption of Chemicals

The important industry, from the standpoint of the manufacture and sale of chemicals, is of course the chemical pulp industry. As an indication of the tonnage used by the paper industry in the United States, I give you the statement made in the September 1937 issue of "Chemical & Metallurgical Engineering":

117,500 tons Alum	188,090 tons Limestone
40,000 tons Caustic Soda	88,000 tons Rosin
18,000 tons Casein Size	204,000 tons Sulfur
146,000 tons Chlorine	225,000 tons Salt Cake
344,500 tons Lime	80,000 tons Soda Ash
283,600 tons Silicate of Soda	

Their total is staggering, adding up to 1,753,000 tons, exclusive of coal and wood, which, of course, run to very much higher figures. Let us take a little walk through a large pulp and paper plant to get a picture of where all of these chemicals are consumed.

To begin with, the most important chemical used in the paper industry is H_2O. While hardly anybody purchases water as such, a good deal of work must be done on the water we take from the neighboring stream before we may use it. A large and properly equipped paper mill must provide itself with a water purification plant of the same caliber as any municipality. A 200-ton paper mill requires as much pure water for its economy as a city of 120,000 to 150,000 people. We are faced with the problem of purifying 12- to 15,000,000 gallons of water per day, and this water must be completely freed from any suspended material and color, and must also be bacteriologically sterile. To do this, the water works requires, depending on its water source, different quantities of chemicals. For the most part these water supplies are clarified by the use of alum, together with some alkali, and activated carbon. These produce a floc of aluminum hydroxide which serves to drag down the color and suspended material. After sand filtration this water is of good color and taste, and is free from suspended material.

At this point it is treated with chlorine or chlorine and ammonia to sterilize it completely and leave it in a condition where it will contain enough residual sterilizing material so that the various parts of the paper machine, which in certain months of the year tend to become covered with growth, are kept free from these undesirable plants.

Moving on to the power plant, we find a large institution, consuming several hundred tons of coal per day and requiring a purified feed water in order that the boilers may function properly under the severe conditions of load imposed on a modern, high pressure and high temperature plant. A 200-ton pulp and paper mill will consume approximately 300 tons of coal per day and will generate about 6,000,000 pounds of steam per day, a certain amount of which is recondensed at the various points in the mill and returned to the power plant as distilled water, but approximately half of which must be made up in the form of properly purified raw water. For modern power plants, raw water must be freed from dissolved carbon dioxide and oxygen, and so treated that adherent scale will not form on the boiler tubes; and of the proper alkalinity so that the surfaces of the boilers will not be corroded; nor, at the same time, of such high alkalinity that they may be subject to caustic embrittlement. All of this demands the use of lime and soda, primary, secondary, and tertiary sodium phosphate, and, in certain cases, deoxidizing agents such as sodium sulfite, tannin, or lignin, which remove and convert the dissolved lime and oxygen. While this business has up to now been in the hands of specialists, the art is now well-enough understood and there are enough trained chemists in charge of

Calender end of two new machines at the Union Bag and Paper Corporation, Savannah, Ga., having speed and productive capacities greater than any previous installation in America. Photograph, courtesy the Pusey and Jones Corporation.

operations, so that the purchase of materials for them is now being done on specification and by the general purchasing agent of the mill.

Descending into the pulp mill, we find here a variety of processes where the chemist plays his principal part in the mill. The oldest process is the so-called soda process, in which the raw wood is chipped and boiled with caustic soda to remove the non-cellulosic substances which are soluble in the strength of alkali used. Here, generally speaking, we use about one gallon of alkali per pound of pulp to be made, and as a general average, approximately 8/10 of a pound of soda per pound of pulp manufactured. This soda constitutes a very substantial cost in the operation and may not, therefore, be wasted. Because of this, the waste liquors from the plant are evaporated and reduced to char in a so-called rotary furnace, and from this char the soda is extracted in the form of sodium carbonate which, on treatment with lime in the causticizing plant, is converted into caustic soda solution suitable for the original operation. As a matter of actual practice, about 15% of the soda originally used is lost in one form or another, so that there must be a continuous makeup of this quantity. The lime used for causticizing the recovered sodium carbonate was, in former years, wasted, and is now reburned in long rotary kilns such as cement kilns, and reclaimed for further use. Here again, a small loss of approximately 10% must be made up by the addition of limestone or burned lime. As a by-product of this operation, the spent char from which the soda has been extracted becomes useful as a source of activated carbon.

So-Called Kraft Process

As a development of the soda process, we have the so-called kraft process, which produces a stronger and, until quite recently, unbleachable fiber. Here the operation is substantially the same as in the soda process, except that the alkali solution used contains approximately one-quarter of the alkali in the form of sodium sulfide, which is derived by the reduction of sodium sulfate (salt cake), added to the spent liquors prior to the incineration process. In some mills the sulfide content is obtained by the solution of elementary sulfur in the alkali used for cooking, and thus we get the so-called semi-kraft pulp which, while not so tender as the straight soda pulp, is also not as strong as the true kraft pulp, but at the same time is more readily bleachable. During the last twenty years, the kraft process has made enormous strides and produces today probably the largest quantity of chemical pulp. It is used primarily in so-called mechanical papers, such as wrappings and cartons.

The third type of chemical pulp is the sulfite pulp. Here the chipped wood is cooked under pressure with a solution of calcium, magnesium or sodium bisulfite, containing a substantial quantity of dissolved sulfur dioxide. The chemical plant of a sulfite mill uses as its principal ingredients lime or limestone, dolomitic lime or soda, and elementary sulfur. Whether sulfur or iron pyrites are used is a working detail, but in any event the sulfur content is converted into gaseous sulfur dioxide which is absorbed in suitable towers to give the solution required. During the cooking operation, a substantial amount of sulfur dioxide is liberated, and this is reclaimed to fortify the so-called raw cooking liquor.

The chemical demand is for sulfur, pyrites, lime, limestone, and alkali. The raw pulp obtained in any of these operations consists of almost completely purified cellulose suspended in a liquor containing the dissolved substances removed from the wood.

The average news print mill produces or purchases a quantity of raw sulfite pulp equal to about 20% of its production. As mentioned above, most kraft is used in the unbleached form and, to a small extent, sulfite pulp goes into mechanical papers such as butchers' wrapping and the like. The largest proportion of the chemical pulps other than kraft are bleached and used for various so-called cultural papers such as writing, bonds, publication, posters, labels, etc.

The bleaching operation was formerly conducted entirely with chloride of lime. This constituted a very substantial purchase since the bleach requirement was approximately 15% of the pulp produced. In recent years, with the development of suitable machinery, processes known for a long time, employing chlorine directly, have been put to work so that today a big portion of chloride of lime has been displaced by chlorine.

Because of the large quantities of alkali and chlorine used, paper mills were the first to engage in the manufacture of electrolytic soda and chlorine. These materials made at the plant do not enter into commercial fields, yet they constitute a serious competitor for the sales representative who is offering alkali and chlorine to the trade. I have spent much time studying the economics of this proposition, and there is much to be said pro and con whether a pulp mill can afford to "buy milk rather than keep a cow." The situation changes because of obsolescence of the mill equipment, variation in the ratio of chlorine and soda required, changes in power plant cycles, and above all, changes in the manufacturing conditions within the soda and chlorine industries that permit sales to be made at prices of which pulp manufacturers having their own plants must take cognizance. During the years, I have seen several shifts that threw the problem into the background and foreground.

Having produced raw pulp, the job of the pulp mill is ended, and its production is merchantable. These producers sell papermakers who require relatively small quantities of pulp and those located in areas such as Great Britain and Japan, where the local stands of wood do not permit of the manufacture of pulp. We in the United States have, too, a large number of smaller paper manufacturers and converters who produce their products entirely from purchased pulp. It is ordinarily not practical to manufacture every grade

of pulp that a paper mill requires, and from this standpoint, the larger paper mills frequently prefer to buy small quantities of specialty pulps from their competitors. The other large use for pulp, which is assuming enormous proportions, is that used for rayon, cellophane, and more recently, stable fiber.

A Mechanical Operation

The paper mill is a mechanical industry which takes a certain quantity of pulp produced by any of the processes mentioned above, and by the suitable addition of fillers, sizing agents, etc., converts these into a finished product which we recognize as paper, the different varieties of which are exceedingly numerous. The most important types, from a consumer standpoint, are news print, wrappings, board, publication, posters, labels, writing, bonds, etc. Each constitutes a chemical and mechanical problem all its own. In previous years, paper was not traded in on a specification basis, except for weight and size. The last ten years have so completely changed the picture that the production and sale of paper today is largely a specification matter.

Having selected the pulp that he proposes to use, the papermaker is confronted with a choice of filler which may constitute up to 30% of his finished product. In times gone by, the principal filler was clay. We have, during the last ten years, seen the introduction of high grade chalks, mixtures of calcium carbonate and magnesium hydroxide, calcium sulfite, calcium sulfate, certain barium products such as blanc fixe, titanium dioxide, and a variety of specially purified clays.

Having selected his filler, the papermaker now must decide on the type of sizing. In previous times the general technique called for the use of so-called alum and rosin size. These chemicals were used to the extent of approximately 2% of the paper to be manufactured, and served a variety of purposes, the most important of which was to make the paper more resistant to water inks and to protect it to a degree from water penetration. The technology since the 1929 depression has changed all of this very radically. A large amount of paper is manufactured today without any attempt to size it. Other papers are manufactured so that they obtain the sizing effect by the use of surface coatings of starch, glue, and, more recently, plastics. The type of sizing to be used is also influenced by the type of coloring which is required for the tinting of the paper to the shade desired. A great many of the dye stuffs used in the paper industry are color lakes, which must be properly combined with the cellulose fiber in order to give a permanent color. The application of these lakes calls for careful control of the acidity during the paper-making operation and the proper use of certain aluminum compounds such as alum and sodium aluminate.

The type of filler frequently determines the kind of ink that may be used in printing the paper. All of you have probably noticed the rise of multi-colored printing in our large-selling magazines. The papers that were available ten years ago did not permit multi-color jobs on the scale demanded by present-day advertising. The time required to turn out the job, were the paper available, would have been prohibitive. This necessitated a very close cooperation between the printing ink people and the paper people, and in the last analysis the job fell back into the lap of the chemical salesmen who had to supply the raw materials they both required.

Too much stress cannot be laid upon the importance of the chemical salesman in these industries. To some extent he becomes a service man, and to a very large extent he becomes the teacher of the industry. The chemical salesman who is not well-enough equipped that he can talk authoritatively on the merits of his product for the requirement in hand, gets only passing attention in this industry unless he is well fortified with service men who are specialists in the application of the chemicals he has to sell.

The third large class of paper product is the so-called coated paper. Here the product consists of a sheet of paper formed from any of the raw materials mentioned above, and then faced with a material that will provide a finished surface considerably smoother than can be produced on the paper machine. These papers are required for very fine printing, where fine screen halftone prints are used. The principal type of coated paper is casein coated, in which the facing material consists of very fine clays suspended in an ammonia solution of casein. Up until a few years ago, this was practically the only type of coating used. However, new developments have brought other plastics into the field, with the result that the coated paper manufacturer has available to him a large choice of substances, among which may be mentioned linseed oil compounds, nitrocellulose, cellulose acetate, polyvinylite, resins, and a host of new materials which are constantly being developed. Curiously, the field of the coated paper manufacturer is, to some extent, being taken over by the original paper manufacturer who has learned that there are ways of smoothing the surface of his product by special types of calendering, and by the application of certain facing materials directly on the paper machine during the manufacture of the original stock.

Outlet For Finishing Materials

The field here is relatively new and is being exploited in many directions. The outlet for chemicals and finishing agents is very large. Here the paper manufacturer welcomes the supplier who can furnish him with products for doing an old job in a better way. By the same token, a number of softening agents have found their way into the paper industry in recent times for the purpose of making the paper more pliable, and with a view toward maintaining a more constant moisture content. Since paper is subject to variation in size, because of its sensitivity to atmospheric moisture changes, there is a large field open to the supplier of

those chemicals which can be used for stabilizing the moisture content of the paper. One of these chemicals is glycerin, and there is good reason to believe that many other poly-hydric alcohols and sugars may be useful.

The field for the chemical salesman in the paper industry is almost virginal. The amount of work that has been done is but a small part of what remains. The welcome sign is out for all those who have constructive offers to present. There is certainly every reason for the chemical salesman to be bullish on his prospects in the paper industry.

Safe Handling of Flammable Solvents in Drums

From a recent issue of *National Safety Council News Letter*, we digest the following rules and precautions for filling drums with flammable liquid and preparing them for shipment:

(1) The drum should be properly grounded so as to prevent the possibility of a static spark.

(2) If a hose is used for filling, it should be provided with a brass nozzle. If pipe is used, the pipe fittings should be brass or other non-sparking metal.

(3) Provision should be made for carrying away vapors displaced from the drum as it is filled. If much filling is to be done, it is preferable to have a vent line from the drum that returns to the solvent supply tank.

(4) If the drum rests on scales while being filled, the scales should also be grounded.

(5) Tools used around solvent drums should be of non-sparking type. Where it is necessary to use a hammer, wooden mauls have been found satisfactory.

(6) When a drum is filled, care should be taken to see that the proper outage is provided. (The outage is the vacant space above the liquid which is necessary for expansion. The amount of outage varies with the contents.)

(7) After the drum is filled, the bungs should be screwed down carefully. The operator should check to see that the gasket on the bung is sealed properly and does not become twisted or cut.

(8) Full drums should be checked carefully for leaks. The drums must be handled with care. They should never be dropped.

(9) Many drums used for shipping solvents are made in accordance with the Interstate Commerce Commission, Specification 5E, and are marked STC (Single Trip Container). These drums are intended for shipping only once and cannot be refilled and reshipped under the rules of the I.C.C.

(10) Full drums of liquids to be shipped require the I.C.C. red label and the name of the contents should be labeled on the drum.

The following procedures are recommended for the safe storage and unloading of drums containing flammable liquids:

(1) Full drums should not be stored in the sun, especially in the summer. The heat of the sun will frequently cause excessive pressure to develop which will spring the head of the drum and probably start a leak. This is particularly true when proper outage has not been provided. If drums must be stored in the summer sun they should be sprinkled with water to keep them cool.

(2) In opening the drums, a pipe wrench or a plug wrench should be used. Non-sparking tools are advisable.

(3) The operator should face away from the drum when opening the bung so that any material that might blow out will not strike his face.

(4) When opening the bung it should be turned only one thread. If any internal pressure has developed, it should be allowed to vent off through the loosened threads before the bung is removed entirely.

(5) Before unloading, drums should be set on suitable racks so that the drum will not roll or tilt while being unloaded. The practice of scotching the sides of the drum with blocks of wood or bricks is not recommended. Suitable racks which will hold the drum steady should be provided.

(6) The safest means of removing flammable liquids from drums is to pump it from the top of the drum by means of a hand pump. The common use of an ordinary nipple and valve is considered less safe because there is frequently leakage at the nipple or valve. Also, if the drum is upset, the nipple may be broken off and there will be no way to stop the flow of liquid readily.

(7) There should be a ground connection between the drum and pump and the container being filled.

(8) When the drum is vented to allow air to enter as the liquid is removed, some operators make the mistake of removing the vent bung entirely. Usually this is not necessary and sufficient vent can be obtained through the loose threads of the bung. Care should be taken that the bung is not removed completely and set aside leaving the hole open.

(9) After the drum is emptied, the bung should be replaced and tightened.

(10) Drums from which all of the liquid has been removed are frequently the most dangerous from an explosion standpoint. As long as a drum is full, or almost full of liquid, the air space above the liquid is usually above the upper explosive limit. Of course, there is always some point where the vapors pass through the explosive range as air is drawn into the drum. However, when all of the liquid is removed the air drawn into the vent has so diluted the rich vapors that the entire drum is frequently filled with a vapor-air mixture within the explosive range.

(11) Special care should be taken in disposing of empty drums and in cleaning them before they are put into some other service. Of course, drums should be completely cleaned before any repair work is done on them.

(12) Drums can be cleaned by washing with water and then purging thoroughly with live steam. They should then be tested with a reliable combustible gas indicator. Even after these precautions, it is a good idea to purge the empty drum with CO_2 before welding or soldering on the drum. This is particularly desirable in cases where the drum has contained viscous or gummy substances which might adhere to the inside and tend to liberate vapors even after thoroughly washing. A 2 lb. CO_2 extinguisher contains more than enough gas to thoroughly purge a 55-gal. drum.

The following general precautions should be taken around operations where flammable liquids are handled in drums:

(1) There should be strict rules prohibiting the use of fires or open flames near the point of handling. Signs to this effect should be conspicuously posted.

(2) A "No Smoking" rule should be established and enforced.

(3) Adequate fire protection equipment should be available. Portable extinguishers of the CO_2 and Foam types are usually the most efficient on flammable liquid fires.

(4) Fire blankets or showers should be available to put out fire in employees' clothing.

Creating Industries, 1919-1939

Natural Gas

By James B. Garner

The development of the natural gas industry and its utilization as a raw material for the synthesis of hundreds of important chemicals constitutes one of the most romantic pages in the industrial history of the United States. Dr. James B. Garner, Senior Fellow of Mellon Institute, in charge of the Institute's investigations in the chemistry and technology of natural gas, reviews first the early historical background, then discusses the chemical composition of natural gas and presents pertinent information on the major present day uses. In addition, he supplies considerable pertinent statistical data on natural gas, carbon black, liquefied petroleum gases, etc.

FROM earliest times natural gas has been inseparably connected with problems of everyday life—religious, social and economic. The ancient Persian fire worshippers made religious pilgrimages to the burning natural gas springs of Baku. These springs helped confirm the belief in a literal Hell of fire common to all races of Semitic origin which has come down to us as one of our heritages. Later on, man began to utilize natural gas to aid in the solution of certain of his social and economic problems. Although the early organic chemists—Liebig, Wöhler, Hofmann, Ladenburg, Kekulé, Würtz, and Fittig—were conversant with the chemical and physical properties of the various constituents of natural gas, practically no effort was made until the beginning of the present century to use it or its constituents as a source of chemical raw materials. Great progress has been achieved within the last 20 years

Development of Natural Gas Industry

The first commercial gas well in America was drilled to a depth of twenty-seven feet at Fredonia, N. Y., in 1821. The deepest natural gas (and oil) well in the United States was drilled to a depth of 15,004 feet at Wasco, Cal., in 1938. There are now over 54,000 gas wells operating in the United States. The Candelaria No. 1, well in Harris County, near Houston, Texas, had a "shut-in" pressure of 4,800 lbs., gage. The depth of this well is 8,101 feet. In 1937, there was a marketed production of 2,370,000,000,000 cubic feet of natural gas.

In 1824, gas was used for lighting purposes in the town of Fredonia, and, on the occasion of Gen. Lafayette's visit in 1825, not only was the town lighted, but the meals prepared for Lafayette at the hotel were cooked by gas. In 1840, John Criswell burned natural gas under his salt evaporating pans at Centerville, Pa.; the beginning of the industrial use of gas in the United States. In 1937, there were 8,250,000 domestic consumers, 675,000 commercial consumers, and 42,000 industrial consumers of natural gas.

The first natural gas corporation was the Fredonia Gas, Light, and Water Works Co., organized in 1865. From that small beginning of a few thousand dollars expenditure at Fredonia there is now an investment in gas properties greater than the investment in the production of steel.

The first natural gas pipe line was a two-inch one, delivering four million cubic feet of gas per day from Newton well to Titusville, Pa.; completed August 1, 1872. There are now approximately 180,000 miles of transporting and distributing natural gas mains in the United States. Many lines are twenty and twenty-two inches in diameter, one is a thirty-six inch line. The longest pipe line is approximately one thousand miles and in it about two hundred million cubic feet per day can be transported.

The first natural gas compressing station was put in operation in 1880, by the Bradford Gas Co., Rixford, Pa. This plant had a compressing capacity of five million cubic feet per day and discharge pressure of sixty pounds. All large natural gas transporting systems are now dotted here and there with large compressing stations with capacities of many millions of cubic feet per day and some have discharge pressures well over 400 pounds. The Panhandle Eastern Co., has 72,700 installed horse power compressing capacity.

Our first carbon black factory was built by Peter Neff at Gambier, Ohio, in 1885. He used the channel process. In 1937, fifty-seven carbon black plants had an annual production of 66,381,000 pounds. The black of today is made by the channel, thermatomic, roller, and certain special processes.

The first plant for the recovery of gasoline from natural gas by the compression and cooling method was built by Andrew Fasenmeyer in 1904, almost on the site of the Drake well (the first commercial oil well) near Titusville, Pa. In 1936, 312 compressing plants have an annual capacity of 213,188,000 gallons.

The first liquefied petroleum gas plant was built by A. N. Kerr at Sistersville, W. Va., in 1910. In 1937, twenty-nine plants have an annual marketed production of 141,505,000 gallons.

The first plant for gasoline recovery by the oil-absorption method was built by John G. Pew of the Hope Natural Gas Co. at Hastings, W. Va., in 1913. In 1936, there were 393 oil-absorption plants with an annual capacity of 1,573,904,000 gallons of gasoline.

Helium was discovered in natural gas by Cady and McFarland in 1907, in a sample from a well at Dexter, Kan. The first commercial production of helium was

at Fort Worth, Texas, in 1918, operated under George A. Burrell and Richard B. Moore. In 1935, there were two large plants, one at Fort Worth and the other at Amarillo, Texas. During the period April, 1921, and June, 1936, more than 122 million cubic feet of high purity helium were produced.

The first charcoal-adsorption plant for gasoline recovery from natural gas was built in 1919, at Lewis Run, Pa., on the property of the United Natural Gas Co. In 1936, ten such plants operated with an annual capacity of 9,248,000 gallons of gasoline.

The first plant wherein natural gasoline was fractionated into iso-pentane, pentane, hexane, and heptane was put in operation in August, 1920, at Hastings, W. Va., on the property of the Hope Construction and Refining Co. In 1937, 2,833,000 gallons of pentane and various quantities of ligroin, benzine, and other petroleum ethers were marketed.

Summary of statistics for natural gas in the United States, 1932-37

	1932	1933	1934	1935	1936	1937[1]
Marketed production:						
California ....millions of cubic feet	263,484	259,799	268,122	284,109	320,406	335,000
Louisiana ....do...	201,561	197,826	225,713	249,450	290,151	320,000
Oklahoma ....do...	255,487	245,759	254,457	274,313	280,481	295,000
Texas ....do...	456,832	475,691	602,976	642,366	734,561	860,000
West Virginia ....do...	100,540	100,653	109,161	115,772	138,076	153,000
Other States ....do...	278,086	275,746	310,292	350,585	404,127	407,000
Total production ....do...	1,555,990	1,555,474	1,770,721	1,916,595	2,167,802	2,370,000
Exports:						
To Canada ....do...	83	69	73	73	84	89
To Mexico ....do...	1,610	2,089	5,728	6,727	7,352	7,900
Imports from Canada ....do...	38	83	68	106	152	289
Consumption:						
Domestic ....do...	298,520	283,197	288,236	313,498	343,346	364,000
Commercial ....do...	87,367	85,577	91,261	100,187	111,623	118,000
Industrial:						
Field ....do...	529,378	491,159	554,542	580,414	618,468	650,000
Carbon-black plants ....do...	168,237	190,081	229,933	241,589	283,421	341,085
Petroleum refineries ....do...	67,467	66,333	79,965	80,175	93,183	(2)
Electric public-utility power plants[3] ....do...	107,239	102,601	127,896	125,239	156,080	(2)
Portland-cement plants[4] ....do...	21,440	22,001	27,331	26,752	36,923	(2)
Other industrial ....do...	274,687	312,450	365,824	442,047	517,474	889,215
Total consumption ....do...	1,554,335	1,553,399	1,764,988	1,909,901	2,160,518	2,362,300
Domestic ....per cent.	19	18	16	17	16	15
Commercial ....do...	6	6	5	5	5	5
Industrial ....do...	75	76	79	78	79	80
Number of consumers:						
Domestic ....thousands	6,506	6,691	6,984	7,391	8,017	(2)
Commercial ....do...	531	541	582	613	657	(2)
Industrial[5] ....do...	30	30	31	36	39	(2)
Number of producing gas wells	54,160	53,660	54,130	53,790	53,960	(2)
Value (at wells) of gas produced:						
Total ....thousands of dollars	98,985	97,096	106,438	110,402	119,193	125,610
Average per M cubic feet ....cents	6.4	6.2	6.0	5.8	5.5	5.3
Value (at point of consumption) of gas consumed:						
Domestic ....thousands of dollars	223,377	209,699	215,029	233,940	251,617	263,172
Commercial ....do...	44,000	42,582	45,287	49,386	53,693	56,050
Industrial ....do...	116,746	115,838	133,941	144,748	170,129	191,780
Total value ....do...	384,123	368,119	394,257	428,074	475,439	511,002
Average per M cubic feet:						
Domestic ....cents	74.8	74.0	74.6	74.6	73.3	72.3
Commercial ....do...	50.4	49.8	49.6	49.3	48.1	47.5
Industrial ....do...	10.0	9.8	9.7	9.7	10.0	10.2
Domestic and commercial ....do...	69.3	68.4	68.6	68.5	67.1	66.2
Domestic, commercial, and industrial ....do...	24.7	23.7	22.3	22.4	22.0	21.6
Treated for natural gasoline:						
Quantity ....millions of cubic feet	1,499,756	1,551,464	1,776,172	1,822,000	1,815,000	2,040,000
Per cent. of total consumption	96	100	101[6]	95	84	86

[1] Subject to revision.
[2] Figures not yet available.
[3] Geological Survey.
[4] Chapters on cement in Minerals Yearbook and Statistical Appendix to Minerals Yearbook.
[5] Exclusive of oil- and gas-field operators.
[6] Exceeds 100 per cent. as part of the natural gas treated for natural gasoline is blown to the air and not included in total consumption.

The first solid (dry ice) and liquid carbon dioxide recovery from natural gas was at Klickitat, Wash., 1932. It produces three tons of dry ice daily. In 1937, there were three other plants—one in Carbon County, Utah, producing 10 tons dry ice and 15 tons liquid daily; and two in Harding and Torrance Counties, New Mex., one of which produces 30 tons dry ice daily. No use is made of the large volumes of carbon dioxide available in Jackson County, Col.

In the decade 1870 to 1880, natural gas production

Natural gasoline produced and natural gas treated in the United States in 1936,[1] by States

State	Number of operators[2]	Number of plants operating	Natural gasoline produced: Thousands of gallons	Value at plants: Thousands of dollars	Value at plants: Average per gallon (cents)	Natural gas treated: Millions of cubic feet	Natural gas treated: Average yield per 1,000 cubic feet (gallons)
Arkansas	6	8	11,957	541	4.5	2,955	4.05
California	33	87	593,416	35,437	6.0	372,118	1.59
Colorado	2	2	451	18	4.0	223	2.02
Illinois	20	48	2,337	134	5.7	971	2.41
Kansas	12	18	37,775	1,542	4.1	106,230	.36
Kentucky	6	6	6,009	346	5.8	35,493	.17
Louisiana	16	29	72,687	2,945	4.1	115,606	.63
Michigan	2	2	2,015	106	5.3	1,419	1.42
Montana	1	1	2,071	100	4.8	8,238	.25
New Mexico	3	4	28,921	999	3.5	29,489	.98
New York	1	1	22	2	9.1	22	1.00
Ohio	6	12	6,991	436	6.2	33,103	.21
Oklahoma	56	152	418,591	17,516	4.2	255,433	1.64
Pennsylvania	61	105	14,267	722	5.1	34,168	.42
Texas	66	134	520,547	19,670	3.8	673,483	.77
West Virginia	27	81	44,389	2,306	5.2	128,488	.35
Wyoming	6	10	33,894	1,752	5.2	17,561	1.93
Total 1936	263[2]	700	1,796,340	84,572	4.7	1,815,000	.99
1935	278[2]	715	1,651,986	70,940	4.3	1,822,000	.91

[1] Complete figures for 1937 not yet available.
[2] A producer operating in more than 1 State is counted only once.

Salient statistics of the natural-gasoline industry in the United States, 1933-37, in thousands of gallons

	1933	1934	1935	1936	1937[1]	Per cent. of change in 1937 from 1936
Production:						
Appalachian	56,292	58,601	61,315	65,669	73,772	+12.3
Illinois, Kentucky, and Michigan	8,375	8,570	10,106	10,361	12,428	+19.9
Oklahoma City	96,465	102,591	120,127	128,783	163,437	+26.9
Seminole	110,763	95,186	97,599	115,557	121,927	+ 5.5
Texas Panhandle	183,794	256,130	276,602	218,703	228,725	+ 4.6
East Texas	20,213	46,280	78,210	140,091	187,713	+34.0
Rocky Mountain	54,955	58,427	53,965	65,337	74,299	+13.7
Kettleman Hills	133,486	152,434	153,936	171,052	177,460	+ 3.7
Long Beach	88,400	76,147	83,653	89,366	83,611	— 6.4
All other districts	667,257	680,994	716,473	791,421	915,728	+15.7
Total production	1,420,000	1,535,360	1,651,986	1,796,340	2,039,100	+13.5
Stocks:						
Total at plants, terminals, and refineries, Jan. 1	134,256	154,560	177,086	155,316	170,310	......
Total at plants, terminals, and refineries, Dec. 31	154,560	157,060 177,086[2]	155,316	170,310	199,836	+17.3
Net change	+4,796	+2,500	—21,770	+14,994	+29,526	......
Total supply[3]	1,415,204	1,532,860	1,673,756	1,781,346	2,009,574	+12.8
Distribution:						
Blended at refineries[4]	1,010,478	1,132,152	1,271,760	1,367,814	1,593,144	+16.5
Run through crude-oil pipe lines in California	54,054	50,652	31,290	52,500	57,708	+ 9.9
Exports Direct shipments to consumers	204,123	214,242	135,366 116,340	107,058 139,230	148,428 143,640	+38.6 + 3.2
Losses	146,549	135,814	119,000	114,744	66,654	—41.9
Total distribution	1,415,204	1,532,860	1,673,756	1,781,346	2,009,574	+12.8

[1] Preliminary figures.
[2] For comparison with 1935.
[3] Production plus or minus changes in stocks.
[4] Including amounts run through crude-oil pipe lines east of California.

and utilization were practically confined to the states of New York, Pennsylvania, West Virginia and Ohio. In 1936, natural gas was produced in Alabama, Arkansas, California, Colorado, Illinois, Indiana, Kansas, Kentucky, Louisiana, Michigan, Mississippi, Montana, New Mexico, New York, Ohio, Oklahoma, Pennsylvania, South Dakota, Texas, West Virginia, Utah, Washington, and Wyoming. In addition, natural gas was marketed in the District of Columbia, Florida, Nebraska, Minnesota, Iowa, Missouri, Wisconsin, Tennessee, Virginia, and Maryland.

The magnitude of the natural gas industry can only be partially understood by statistical data. Various authorities have been consulted and the following have been obtained from the "Minerals Yearbook," Bureau of Mines, Department of Interior, 1937:—

Chemical Composition of Natural Gas

Natural gas is for the most part composed of the hydrocarbons of the paraffin series. However, its composition varies considerably in the different fields. Carbon dioxide, nitrogen, hydrogen sulfide, and helium are sometimes present. Natural gas of the Eastern or Appalachian fields is almost entirely made up of methane, ethane, propane, the butanes, and the vapors of pentane, hexane, heptane and octane. That from some parts of Texas, Oklahoma and Kansas is high in nitrogen content and sometimes in it helium is found. Practically all the so-called "sour" gas contains hydrogen sulfide and organic sulfur compounds. Some natural gas of Colorado, Utah, New Mexico and Washington contains high percentages of carbon dioxide. Details of analyses of gases in the various regions are available in the publications of the Bureau of Mines.

Natural gas as distributed is for the most part refined. It has been processed for the elimination of suspended and finely divided solids and water. On practically all the large transporting systems gasoline and liquefied petroleum gas recovery plants are installed. In some few instances natural gas is processed to remove its content of hydrogen sulfide and organic sulfur compounds. The so-called "dry" natural gas of commerce is mainly made up of the hydrocarbon methane associated with varying quantities of ethane, propane and the butanes.

The liquefied hydrocarbons—whose critical temperatures are above the prevailing atmospheric temperatures—are ethane, propane, normal butane, and iso-butane. These are recovered in a high state of purity in plants generally associated with natural gasoline recovery plants. The processes involved are those of distillation and fractionation.

Natural gasoline is recovered by three processes: compression and cooling, oil absorption, and charcoal adsorption and is marketed in a variety of grades, generally based upon two factors, the Reid Vapor Pressure Test at 100° F., expressed in pounds per square inch pressure, and the percentage which is distillable and recoverable at 140° F. Both methods are official and standardized by the U. S. Bureau of Mines.

The chemical composition of natural gasoline will vary with its grade of commercial quality. Generally speaking it is composed of normal butane, the pentanes, the hexanes, the heptanes, and the octanes. Those gasolines which have Reid vapor pressures in excess of 22 lbs. also contain variable quantities of iso-butane and may carry some propane. Practically all the marketed natural gasoline is processed to remove hydrogen sulfide and organic sulfur by one of the following treatments: dilute caustic soda, dilute sodium hypochlorite, or cupric sulfate.

Major Present Day Uses

Three classes of consumers use of natural gas: domestic, commercial and industrial. During 1936, 2,175,000,000,000 cubic feet were consumed, and 7,500,000 domestic consumers used 16% of this volume; 650,000 commercial consumers used 5% for baking, enameling and minor metallurgical and power purposes; 40,000 industrial consumers used 79%. Large industrial consumers are manufacturers of carbon black, petroleum products, electric power, Portland cement, glass, ceramic wares, steel and non-ferrous metals. Approximately 60 billion cubic feet were used in enriching manufactured gas.

In 1936, sales of carbon black were 467,736,000 pounds, 89% to rubber companies for the use of carbon black has marked influence in increasing the resiliency and resistance to abrasion of rubber. During 1936, 708,000 long tons of rubber were processed with carbon black and the use of this material enabled the reclaiming of 133,000 tons of used rubber. Printing ink used 6% of the carbon black sold. Two per cent. total was incorporated in paints, varnishes, lacquers and enamels; 3% utilized for miscellaneous purposes, such as shoe polish, crayons, etc.

Natural gasoline was produced in 1936 to a total of 1,750,728,000 gallons. Gasoline refineries used 85% of this total as blending fluid in refinery gasoline. Natural gasoline amounts to 6.7% of our motor fuel production, and 7% of the year's production was exported, while 8% was sold to jobbers to be used directly as motor fuel.

In producing natural gasoline at one of the large oil-absorption plants, there is a substantial production, by distillation and fractionation, of pentane and various petroleum ethers. The pentane thus produced is largely used for chlorination purposes and the petroleum ethers as solvents. Several well-known dry-cleaning preparations and fluids are narrow-cut fractions of natural gasoline.

Liquefied petroleum gases—propane, normal butane, iso-butane, and various mixtures of these hydrocarbons—were marketed during 1936 in the quantity of 106,652,000 gallons; approximately 28.8% as domestic fuel; 8.8% in gas manufacture; 11.7% directly as

fuel in internal combustion engines; 51.2% as industrial fuel, steel cutting gas, and for chemical manufacturing purposes. All other uses were less than 1%. No liquid ethane was marketed as such, though the possibilities of its production are greater than of either propane or the butanes. It is to be noted that the amount of liquefied petroleum gases reported as marketed does not even closely approximate the amount of mixtures of ethane, propane and the butanes (delivered through pipe lines) which has been utilized chemically for the production of well known synthetic substances.

Helium, the post-war and air-defensive commodity of the natural gas industry, was produced to the extent of 10,418,480 cubic feet during 1935. Use of this lighter than air, non-inflammable gas in dirigibles and in crafts lighter than air is well known, but the employment of this gas mixed with oxygen for treating asthma and other respiratory tract diseases is quite important and far less generally known.

Other and Prospective Uses

Use of natural gas hydrocarbons, collectively or as separated compounds, as chemical raw materials has not been as extensive as it could and should have been. However since 1918, two new chemical industries have been founded, and substantial progress has been made, in connection with existing industries, for the use of natural gas hydrocarbons. One is based upon the reactivity of these hydrocarbons with chlorine. The other is founded on the ability of these hydrocarbons to decompose under controlled influence of heat, pressure, and catalyst, and yield the so called olefine hydrocarbons. These hydrocarbons are admirably adapted to the production of alcohols, glycols, ethers, esters, ketones, etc.

The Sharples Co. has utilized the chlorination reactions of pentane to produce approximately fifty synthetic chemicals of greater or less commercial importance in lacquers, rubber manufacture, ore flotation, emulsification, as detergents, as germicides, as odorants and as raw materials for synthetic resins and drugs. Less extensive use has been made of methane in the production of methyl chloride. Great possibilities yet unrealized lie in the intensive chlorination of methane to produce methylene chloride, chloroform, and carbon tetrachloride. Methyl chloride is used as a refrigerant in domestic and commercial refrigerators and consid-

Marketed production of liquefied petroleum gases, 1936-37, by uses, methods of transportation, and regional distribution, in thousands of gallons

	Propane	Butane	Propane-butane mixtures	Pentane	Total	Per cent. of total
1936						
Uses:						
Domestic	24,423	2,956	2,048	587	30,014	28.1
Gas manufacturing	944	6,227	2,200	....	9,371	8.8
Industrial fuel and chemical manufacturing	11,030	28,553	13,122	1,880	54,585	51.2
Internal-combustion-engine fuel	105	2,367[1]	10,004[1]	....	12,476	11.7
All other uses	.....	97	1	108	206	.2
	36,502	40,200[1]	27,375[1]	2,575	106,652	100.0
Per cent. of total	34.2	37.7[1]	25.7[1]	2.4	100.0	....
Methods of transportation:						
Bulk	16,319	39,265[1]	24,544[1]	2,447	82,575	77.4
Cylinders and drums	20,183	935	2,831	128	24,077	22.6
	36,502	40,200[1]	27,375[1]	2,575	106,652	100.0
Regional distribution:						
Pacific Coast area	5,434	4,812[1]	13,400[1]	....	23,646	22.2
All other areas	31,068	35,388	13,975	2,575	83,006	77.8
	36,502	40,200[1]	27,375[1]	2,575	106,652	100.0
1937						
Uses:						
Domestic	30,436	6,047	3,504	836	40,823	28.9
Gas manufacturing	1,077	7,430	2,765	8	11,280	8.0
Industrial fuel and chemical manufacturing	14,567	28,278	25,300	1,957	70,102	49.5
Internal-combustion-engine fuel	278	1,715	14,994	....	16,987	12.0
All other uses	116	2,034	131	32	2,313	1.6
	46,474	45,504	46,694	2,833	141,505	100.0
Per cent. of total	32.8	32.2	33.0	2.0	100.0	....
Methods of transportation:						
Bulk	22,650	43,698	42,589	2,642	111,579	78.9
Cylinders and drums	23,824	1,806	4,105	191	29,926	21.1
	46,474	45,504	46,694	2,833	141,505	100.0
Regional distribution:						
Pacific Coast area	6,266	5,447	18,085	....	29,798	21.1
All other areas	40,208	40,057	28,609	2,833	111,707	78.9
	46,474	45,504	46,694	2,833	141,505	100.0

[1] Revised figures.

erable quantities are used in the synthetic drug and dye industries. Methylene chloride is used to some extent in the dye industry. Its most extensive use, however, is as a solvent in extracting caffeine from coffee and tea. Chloroform had some use as an anesthetic, but more recently it has been used as a solvent in the dry cleaning industry. Carbon tetrachloride is used to a greater extent than all the other chlorinated derivatives of methane. It finds application as dry cleaning solvent and in fire extinguishers.

The Carbide and Carbon Chemicals Corp. has used the olefin hydrocarbons, derivable from ethane, propane, and the butanes, to produce successfully in a mass way approximately one hundred synthetic chemicals. Twenty-four of these substances are alcohols and alcohol ethers, four are ketones, twenty-three are esters, five are acids and acid anhydrides, five are aldehydes, four are oxides, fourteen are amines, eight are ethers, seven are chlorinated compounds and six are miscellaneous substances. These chemicals are used extensively in the manufacture of rayon, celluloid, lacquers, enamels, varnishes, artificial leathers, cosmetics and toilet preparations, explosives, chloroform, iodoform, sulfonal, indigo, aspirin, novocaine, photographic supplies, soaps, antiseptics, fumigants, insecticides, perfumes, for mercerizing of cloth, as textile softeners and finishes, plastics, dry cleaning solvents, and as solvents for fats, oils, alkaloids and waxes. "Prestone," the familiar anti-freeze is ethylene glycol. "Vinylite"* resins have unique properties. Isopropyl ether has high octane blending value in the production of motor fuels. Diethylene glycol has had large scale use in two plants in removing water vapor from natural gas to eliminate hydrate formation and thus prevent stoppage in the high pressure transmission lines.

Much research to utilize ethane, propane, and the butanes has been done and as results of some of this work plants have been constructed, mostly in connection with oil refineries, to utilize these natural gas hydrocarbons. The following are of importance:

High purity propane is used in refining and dewaxing lubricating oils. Twenty-one plants with a total daily capacity of 29,400 barrels of finished oil, were in operation in 1935. Propane has selectivity in the separation of paraffinic compounds from the undesirable non-paraffinic compounds.

Normal butane is the most widely used of the liquefied petroleum gases. Various factors, such as low vapor pressure at ordinary temperatures, low initial cost, low cost of storage, low cost of transport, high heating value, narrow explosive range, and high flame temperature have contributed to its widespread use. Several new, interesting fields have been explored and action in these fields is intensive. Reference is made to the production of iso-octane. Both the Universal Oil Products Co. and the Shell Oil Co have succeeded in the conversion of butane into iso-butylene, iso-butylene into di-iso-butylene, and the hydrogenation of the latter into iso-octane (2.2.4 trimethyl-pentane). Two major flight records have been broken by the use of iso-octane as a motor fuel.

Gasoline by Polymerization

Collectively, or separated, ethane, propane and the butanes are sources of gasoline made by polymerization. There are three processes, namely: the Phillips, the Universal Catalytic, and the Pure Oil Thermal. All three are in practical, commercial operation.

From the chemical viewpoint, methane, ethane, propane and the butanes are sources of carbon black, ethylene, ethyl alcohol and a whole series of commercially important substances. To the present a large portion of the research and development work has not resulted in commercial realization. Reference is here had to results of studies which have been made of the reactions which these hydrocarbons undergo with: (a) heat; (b) air; and (c) steam.

All of the hydrocarbons decompose ultimately, when heated, into carbon and hydrogen. Under controlled thermal conditions a variety of substances is produced. About twenty years ago Brownlee and Uhlinger heated natural gas to a temperature of 1,000° C., and decomposed it into its two elements. This work undoubtedly constituted the basis of the present thermatomic process of making carbon black. Within the past five years chemical literature has contained many descriptions of processes, mostly patented ones, in which claims are made that methane, or natural gas high in methane, can be converted when heated under the prescribed conditions into liquid aromatic hydrocarbons such as benzol, toluol, xylol, and naphthalene. Some inventors claim a yield of one gallon of mixed light oils per 1,000 cubic feet of natural gas. Curme and others have shown that pure ethane decomposes under controlled conditions of temperature, pressure and catalyst into ethylene and hydrogen and extensive commercial use has been made of this reaction as described herein before. Ethylene is used largely in the ripening of bananas and citrus fruits. Ethylene bromide is used in large quantities in connection with lead tetraethyl to produce the high octane premium motor fuels of today. Mustard gas, a war gas, is the product of the interaction of ethylene and sulfur monochloride.

Semi-practical use seems to have been made of the fact that natural gas hydrocarbons decompose thermally under very limited conditions into acetylene and hydrogen. It is reported that acetic acid is being made from acetylene and glycerol from propylene at plants in Louisiana. In this case, acetylene is obtained as a by-product in the conversion of hydrocarbon gases into hydrogen.

It has been known since natural gas has been used that the hydrocarbons burn in air to form carbon monoxide, carbon dioxide, and water vapor. Complete

* Trade marks registered.

combustion results in carbon dioxide and water vapor. Incomplete combustion generally results in the formation of both oxides. Theoretically several commercially important substances are intermediately possible of formation when the natural gas hydrocarbons are oxidized, namely: corresponding alcohols, aldehydes and acids. These theoretical considerations have constituted intriguing problems and much study has been made of the possibilities of producing formaldehyde. The yields have been disappointing, however, one small plant is now in the development stage. A mixture of natural gas and air under pressure is heated and a liquid product reputed to be composed of formaldehyde, methanol, dimethyl acetal, and acetone is obtained and marketed. Formaldehyde is sold on the market as formalin (40% by weight formaldehyde) and is used in plastics and resins. In consideration of the large tonnage use of formalin, plastics, resins, formic acid, wood alcohol and oxalic acid, it requires no well developed imagination to foresee that the use of methane for the production of these substances would be exceedingly profitable.

Methane in common with the other hydrocarbons of natural gas, reacts at high temperature with steam to produce mixtures of carbon monoxide and hydrogen. Fischer and Tropsch have patented processes for the use of various mixtures of carbon monoxide and hydrogen. For example, a 2 to 1 mixture of carbon monoxide and hydrogen will give 9.3 pounds of liquid, within the gasoline distilling range, per thousand cubic feet of mixture. This represents a yield of 3.5 gallons of motor fuel per thousand cubic feet of methane. In another mixture in which there was a larger percentage of hydrogen than carbon monoxide, the synthesis of methanol was attained. This phase of the process is practiced on a large scale both in Germany and in the United States. Thousands of gallons of methanol are produced according to this method. Practically all the formaldehyde of commerce is made by causing a mixture of the vapors of methanol and air to pass over a heated spiral of copper or silver. Recently a contact mass has been developed for the FischerTropsch process that is cheaper than the usual cobalt-thorium catalyst but still gives equal yields. Moreover, the synthesis has been controlled so that a large part of the total production is obtained as solid paraffin, from which 60,000 metric tons of fatty acids are being made annually in Germany. The various mixtures of carbon monoxide and hydrogen are generally obtained from the interaction of coke and steam. The application of the Fischer-Tropsch process to methane, or the hydrocarbons of natural gas, will enable the natural gas industry to make all the products as covered by the Fischer-Tropsch process. There is a reasonable pos-

Salient statistics for carbon black made from natural gas in the United States, 1933-37

	1933	1934	1935	1936	1937
Number of producers reporting	25	25	21	20	24
Number of plants	51	50	54	54	57
Quantity produced:					
By States and districts:					
Louisiana ... pounds	54,470,000	66,538,000	64,875,000	59,201,000	66,381,000
Texas:					
Panhandle district ... do...	194,156,000	237,403,000	263,361,000	321,576,000	405,247,000
Rest of State ... do...	24,499,000[1]	24,887,000[1]	24,513,000[1]	12,330,000	15,821,000
Total Texas ... do...	218,655,000[1]	262,290,000[1]	287,874,000[1]	333,906,000	421,068,000
Other States ... do...	(1)	(1)	(1)	18,238,000	23,157,000
Total United States	273,125,000	328,828,000	352,749,000	411,345,000	510,606,000
By processes:					
Channel process ... do...	238,026,000	293,546,000	316,284,000	366,876,000	444,427,000
Other processes[2] ... do...	35,099,000	35,282,000	36,465,000	44,469,000	66,179,000
Stocks held by producers Dec. 31 ... do...	155,969,000	171,799,000	136,086,000	79,582,000	100,497,000
Losses ... do...	686,000	386,000	926,000	113,000	76,000
Quantity sold:					
Domestic:					
To rubber companies ... do...	191,358,000	165,446,000	213,708,000	278,018,000	269,807,000
To ink companies ... do...	18,539,000	16,146,000	15,177,000	17,787,000	18,116,000
To paint companies ... do...	6,260,000	5,365,000	6,550,000	6,914,000	6,159,000
For miscellaneous purposes ... do...	6,025,000	5,035,000	9,916,000	10,299,000	11,503,000
Total domestic sold ... do...	222,182,000	191,992,000	245,351,000	313,018,000	305,585,000
Export ... do...	152,286,000	120,620,000	142,185,000	154,718,000	184,030,000
Total sold ... do...	374,468,000	312,612,000	387,536,000	467,736,000	489,615,000
Value (at plants) of carbon black produced:					
Total	$7,602,000	$11,654,000	$13,755,000	$16,110,000	$17,389,000
Average per pound ... cents	2.78	3.54	3.90	3.92	3.41
Estimated quantity of natural gas used... M cubic feet	190,081,000	229,933,000	241,589,000	283,421,000	341,085,000
Average yield per M cubic feet ... pounds	1.44	1.43	1.46	1.45	1.50

[1] Oklahoma and Wyoming included with "Texas: Rest of State."
[2] 1933: Disk, Lewis, roller, "special," and thermatomic; 1934-37: Lewis, roller, "special," and thermatomic.

sibility that a one to one mixture of carbon monoxide and hydrogen will, at a definite pressure and temperature in the presence of copper or silver as catalysts, yield formaldehyde directly.

Early in the twenties, J. C. Patrick found that when ethylene dichloride and sodium polysulfide reacted, a gummy-looking mass that looked, felt, and acted like rubber was obtained. The basis was thus laid for the manufacture of "Thiokol." This "synthetic" rubber, marketed by the Thiokol Corporation, is now produced at Dow Chemical Co.'s plant, Midland, Michigan. Annual output is about 2,000,000 lbs. It is available in sheet stock, as a liquid, and as a powder for molding and widely used in the petroleum industry and in the printing and other allied industries. It has unique and superior qualities and is said to be serviceable where rubber cannot be employed.

Normal butane is a solvent for the recovery of high grade products: cotton seed oil, soy bean oil and flour, cocoa butter, vitamin "A," nicotine from tobacco, pyrethrum and perfumes from flowers, orange peels to produce orange oil, wool fat from wool, and butter fat from milk. Tremendous quantities of these extractibles are available for commercial exploitation. A wide field of usefulness is clearly indicated. Normal butane is so volatile and so free from foreign substances that all materials thus extracted are free from deleterious odor or taste. The temperature of extraction need not be in excess of 90° F., and thus undesirable thermal reactions are eliminated. The naturally fine color, taste, odor and food or other value are unharmed or modified. The narrow-cut petroleum ethers and naphthas have some usage as solvents in commercial extraction processes, notably in the perfume and soybean industries.

Experiments made at the U. S. Naval Laboratories have demonstrated the great value of liquid propane as fuel in the quick starting of airplanes, even under the most adverse temperature and weather conditions. An auxiliary supply of this fuel on every military plane would be a step forward in our nation's program of preparedness.

A study has been made to determine the possibility

Government helium production and costs, April 1921 to June 1937

Period	Production[1]	Gross operating cost (expenditures in operation and maintenance)[2]: Total	Gross operating cost: Average per M cubic feet produced	Return from sale of residue gas	Net operating cost (gross operating cost less return from sale of residue gas)[2]: Total	Net operating cost: Average per M cubic feet produced
Fort Worth plant:[3]						
Under jurisdiction of Navy Department:	*Cubic feet*					
April to June 1921	260,520	$126,694.05	$486.31			
July to December 1921	1,841,000	320,859.73	174.28			
October 1922 to June 1923[4]	4,069,940	489,299.70	120.22			
July 1923 to June 1924	8,204,665	636,438.38	77.57			
July 1924 to June 1925	9,418,363	451,084.58	47.89			
	23,794,488	2,024,376.44	85.08			
Under jurisdiction of Bureau of Mines:						
July 1925 to June 1926	9,355,623	318,446.40	34.04			
July 1926 to June 1927	6,330,056	277,384.70	43.82			
July 1927 to June 1928	6,687,834	274,210.54	41.00			
July 1928 to Jan. 10, 1929	2,638,894	121,440.65	46.02			
	25,012,407	991,482.29	39.64			
Amarillo plant:[5]						
Under jurisdiction of Bureau of Mines:						
April to June 1929	844,900	27,833.16	32.94	$2,645.32	$25,187.84	$29.81
July 1929 to June 1930[6]	9,805,600	140,146.75	14.30	30,445.43	109,701.32	11.19
July 1930 to June 1931	11,362,730	150,190.53	13.22	32,510.24	117,680.29	10.36
July 1931 to June 1932	15,171,680	148,545.26	9.79	40,862.43	107,682.83	7.10
July 1932 to June 1933	14,749,960	151,165.51	10.25	37,661.70	113,503.81	7.70
July 1933 to June 1934	6,534,270	63,528.33	9.72	17,585.94	45,942.39	7.03
July 1934 to June 1935	10,218,480	114,216.62	11.18	26,517.77	87,698.85	8.58
July 1935 to June 1936	4,663,355	53,179.14	11.40	12,127.19	41,051.95	8.80
July 1936 to June 1937	4,809,230	59,315.43	12.33	12,793.15	46,522.28	9.67
	78,160,205	908,120.73	11.62	213,149.17	694,971.56	8.89

[1] Production from the Fort Worth plant represents volume of airship gas produced, which had an average helium purity of 94 to 95 per cent. Production from the Amarillo plant represents actual helium in the airship gas of better than 98-per cent. purity produced by that plant. Therefore, the advantage of the Amarillo plant from standpoint of cost is about 5 per cent. greater than a direct comparison of the figures indicates.

[2] Gross operating costs for the Fort Worth plant represent expenditures in operating and maintaining the plant, including current expenditures for natural gas. The Government did not own the gas field that supplied the Fort Worth plant, so there was no return from sale of residue. Gross operating cost for the Amarillo plant represents expenditure in operating and maintaining both the plant and the Government-owned gas properties. This gross operating cost at Amarillo is a measure of the amount that must be available to the Bureau of Mines for current expenditure. Returns from sale of residue gas must be deposited to credit of miscellaneous receipts of the Treasury and therefore are not available for expenditure by the Bureau. As the net operating cost is computed by subtracting current returns from current expenditures, it is a measure of the net withdrawal of funds from the Treasury for operation and maintenance.

[3] Costs at the Fort Worth plant are based on compilations by the Bureau of Efficiency from records of the Navy Department and the Bureau of Mines. (Report of Bureau of Efficiency in hearing on Amarillo helium plant before the Committee on Mines and Mining, House of Representatives, 71 Cong., 2d sess., p. 210.) The costs do not include depreciation or depletion, and those for period of Navy jurisdiction do not include cost of Washington administration.

[4] Plant closed in 1922 from January to September, inclusive because of lack of funds.

[5] Compiled from Bureau of Mines records. The costs do not include depreciation or depletion.

[6] Plant shut down entire months of December 1929 and February 1930. Stand-by costs for these 2 months were $19,181.14.

of use of certain non-inflammable dichlorides of propane, normal butane, and iso-butane as insecticides. These dichlorides are all recoverable as by-products in the direct chlorination of these hydrocarbons and preliminary experiments indicate their ultimate successful uses.

Future of Natural Gas

One necessary requirement for the future of natural gas as supplies for chemical and allied industries, is further improvement in both absorption and fractionation methods of natural gas. There must be more intensive production of the separated hydrocarbons. In fact, if the highest usage of natural gas is to be attained, apparatus and methods such as used in liquid air production must be employed for a complete fractionation of natural gas or a separation into its constituents, each in a high state of purity. The chemical and allied industries will then have the opportunity of utilizing these pure constituents in an extensive, acceptable and profitable manner.

As pointed out earlier, 79% of the marketed production of natural gas as a fuel, is utilized in industry as a source of power and heat. Practically no commercial use has been made of the carbon dioxide which results from the complete combustion of these enormous quantities of natural gas. Large quantities are used in gas engines where the air supply is carefully adjusted to secure high efficiency. The discharge gases have a carbon dioxide content of approximately 10% by volume. Carbon dioxide absorbed in a suitable solvent, such as an aqueous solution of soda ash, can be readily isolated and converted into liquid carbon dioxide and dry ice. For example, a 500 h.p., 4-cycle gas engine will use 5,000 cubic feet of 1,000 B.t.u., of natural gas per hour. The discharge gas from such an engine during a twenty-four hour day amounts to approximately 14,000 pounds of liquid or solid carbon dioxide. No new methods or apparatus are needed for the salvage of this material. During 1935, 60 plants were in operation in the United States producing approximately 87 million pounds of carbon dioxide at a sale value of more than four million dollars. Of this total quantity, 25 million pounds were dry ice. In practically all these plants coke or limestone was used as a source of carbon dioxide. Natural gas was used in but one during 1938, namely, California Carbonic Co. At the present time nothing on the market approximates carbon dioxide as a fire extinguishing agent in effectiveness and safety. There is an imperative need of the commercial availability of such an agent to eliminate the great losses of property and life from fire.

Several noteworthy economic factors must be taken into consideration in the appraisal of natural gas as a source of raw materials in the chemical and allied industries, namely: (1) Widespread geographical availability of natural gas in large quantities and over a long period of time; (2) Aggressive and progressive executives in the natural gas industry, men who are willing and ready financially to support reasonable programs of utilization; (3) Availability of results of prior extended research and development work; (4) Readiness of the chemical and allied industries to utilize new synthetic products in place of more expensive and less efficient natural products; and (5) The necessity for the conservation of one of our greatest natural resources and means of national defense.

Industry's Bookshelf

These Amazing Electrons by Raymond S. Yates, Macmillan, N. Y., 326 pp., $3.75. Good, non-technical description of electronics, useful to bring anyone up-to-date on new conceptions of subatomic and physical chemistry.

The History of Pharmacy by James Grier, Pharmaceutical Press, London, 274 pp., 6 s. Compact survey of the evolution of pharmacy from the earliest times.

Selected Topics in Colloid Chemistry by R. A. Gortner, Cornell Univ. Press, Ithaca, N. Y., 169 pp., $2.50.

Stimulating discussions of live problems in colloid chemistry, chiefly from the point of view of biochemistry.

Water-White Hydrocarbons from Trinidad Asphalt by Halley Tansley Gaetz, Grafton Publishing Co., 126 W. 3rd st., Los Angeles, 284 pp., $5.00.

Describes a simplification of the process of preparation of hydrocarbons, summarizes experimentary work resulting in the isolation of 6 or 7 different hydrocarbon series in Trinidad asphalt.

Poison in the Air by Heinz Liepmann, J. B. Lippincott Co., 227 S. 6th st., Phila., 388 pp., $2.50.

A luridly popular account of poison gas in warfare ending with doleful prophecies of microbial warfare for the future.

The Law of Trade & Merchandise Marks in India by S. Venkatesaran, the Madras Law Journal Office, Madras, India, 767 pp.

Of real interest to anyone interested in Indian business. A complete summary of the law and trade customs and use of trade marks and brands in the Indian Empire, which has no uniform trade mark legislation.

General Chemistry, by George H. Haynes and Henry G. Higley, published by the authors, Los Angeles, Cal., 270 pp. A broad, but thin, elementary text for students of chiropractic.

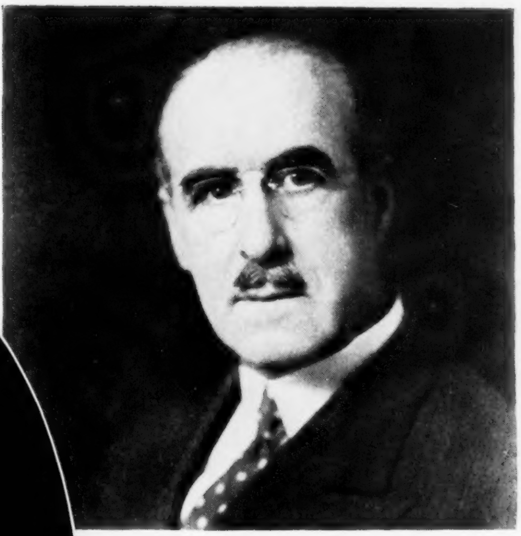
Chemical Calculations by C. M. Jones, Chemical Publishing Co., N. Y., 95 pp., $1.25. Formulas, tables, and problems with clear-cut explanations—a good little handbook.

Chemical Kinetics by Farrington Daniels, Cornell University Press, Ithaca, N. Y., 273 pp., $3.25. Based on the author's papers given in conjunction with the George Fisher Baker Non-Resident Lectureship in Chemistry at Cornell University, from February to June, 1935.

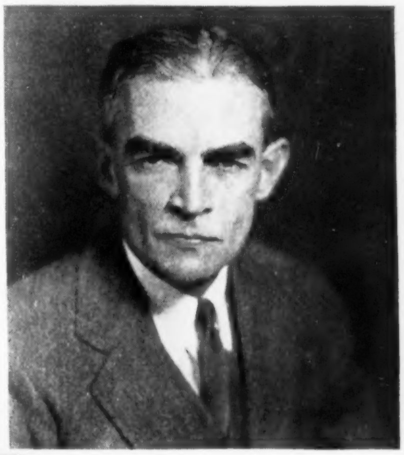
"Headliners"

English Perkin Medalist: Below, J. Baddiley, director of research, Imperial Chemical Industries, Ltd., Dyestuffs Group, who recently received the medal of the British Society of Dyers and Colourists for his outstanding contributions to the advancement of British dyestuffs. Two awards were made in 1938, the other medalist being Dr. H. Dreyfus, chairman and managing director of British Celanese, Ltd.

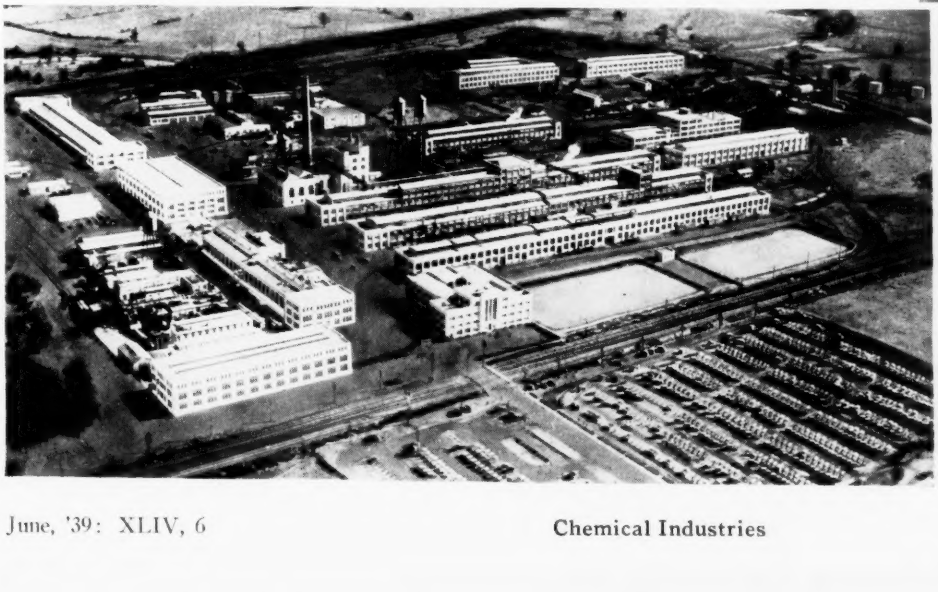
Twenty Years Service: Dr. A. A. Somerville, vice-president and head of the rubber department of the R. T. Vanderbilt Company, who this month completes two decades with the company.



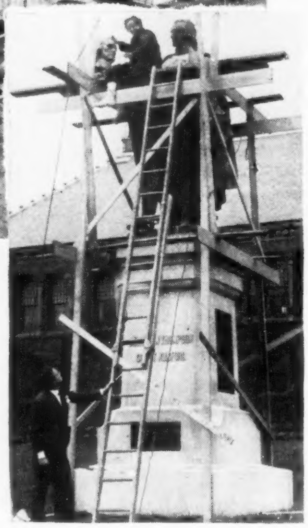
New "Prexy": Dr. F. M. Becket, research consultant for Union Carbide & Carbon, and Electro-Metallurgical, is the new president of the Chemists' Club, N. Y. City. Dr. Becket is a member of CHEMICAL INDUSTRIES' Board of Consulting Editors.



New Calco Head: Right, F. Miller Fargo, Jr., formerly executive vice-president of Calco Chemical, who has been elected president of the company, succeeding Robert C. Jeffcott, who retired April 30. Election of Mr. Fargo was exclusively reported in CHEMICAL INDUSTRIES' May issue, page 547. Below, the newest airplane view of the Calco plant at Bound Brook, N. J.



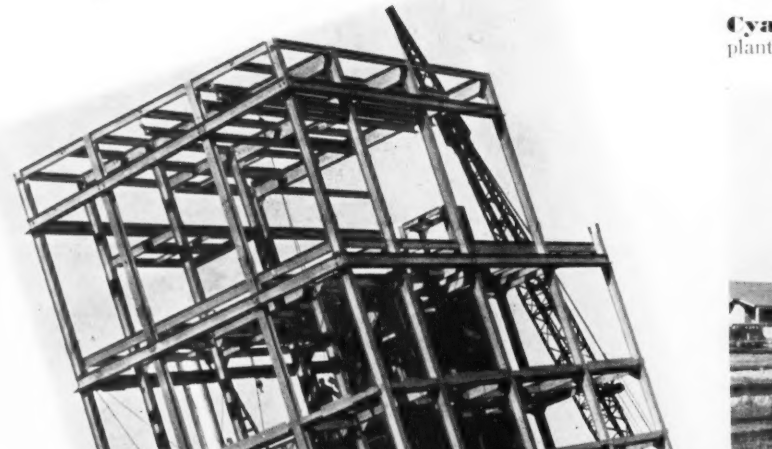
Rumford Celebrates 80th Anniversary



80 Years Young: Celebration of the 80th anniversary of the manufacture of baking powder, in Rumford, R. I., will be held on June 23, and will bring to light many new features and matters of interest to the industry and to the general public. Gov. William H. Vanderbilt of Rhode Island, Miss Suzanne Silvercruys, A. E. Marshall, president of Rumford Chemical, and Count Rumford himself will be among the speakers at an unusual birthday banquet. Count Rumford will be present in the same sense as George Washington was present on his recent widely publicized ride from Mount Vernon to the World's Fair.

Left, Miss Silvercruys at work on the scaffolding surrounding Count Rumford's statue. Below, 56 employes who are second to fourth generation in Rumford Chemical.

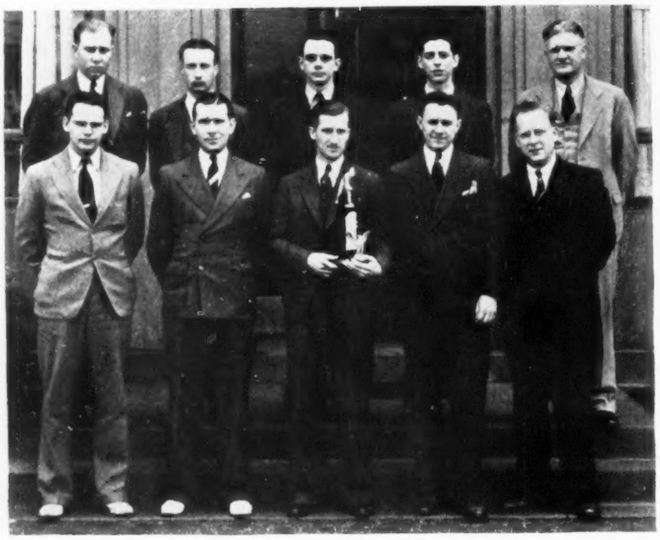
Cyanamid in the South: Below, the new Mobile, Ala., plant of American Cyanamid & Chemical is now in operation.



Acid Reclaiming: Left, Construction is advancing on the acid reclaiming plant at the American Viscose Corporation's Roanoke, Va., plant. Upon completion, the plant, which will reduce stream pollution and production costs, will contain evaporators and crystallizers to concentrate the waste acid from the Viscose spinning department and crystallize the sodium sulfate crystals, which then will again be used in spinning. Photograph, courtesy, Manufacturers' Record.

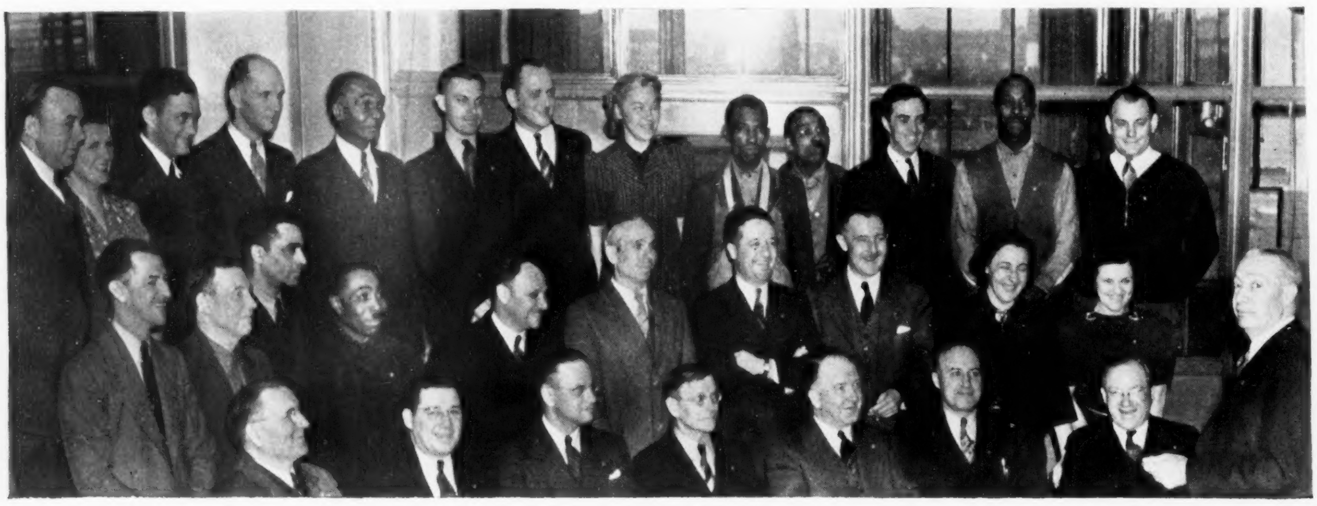
American Institute of Chemists At the N. Y. World's Fair

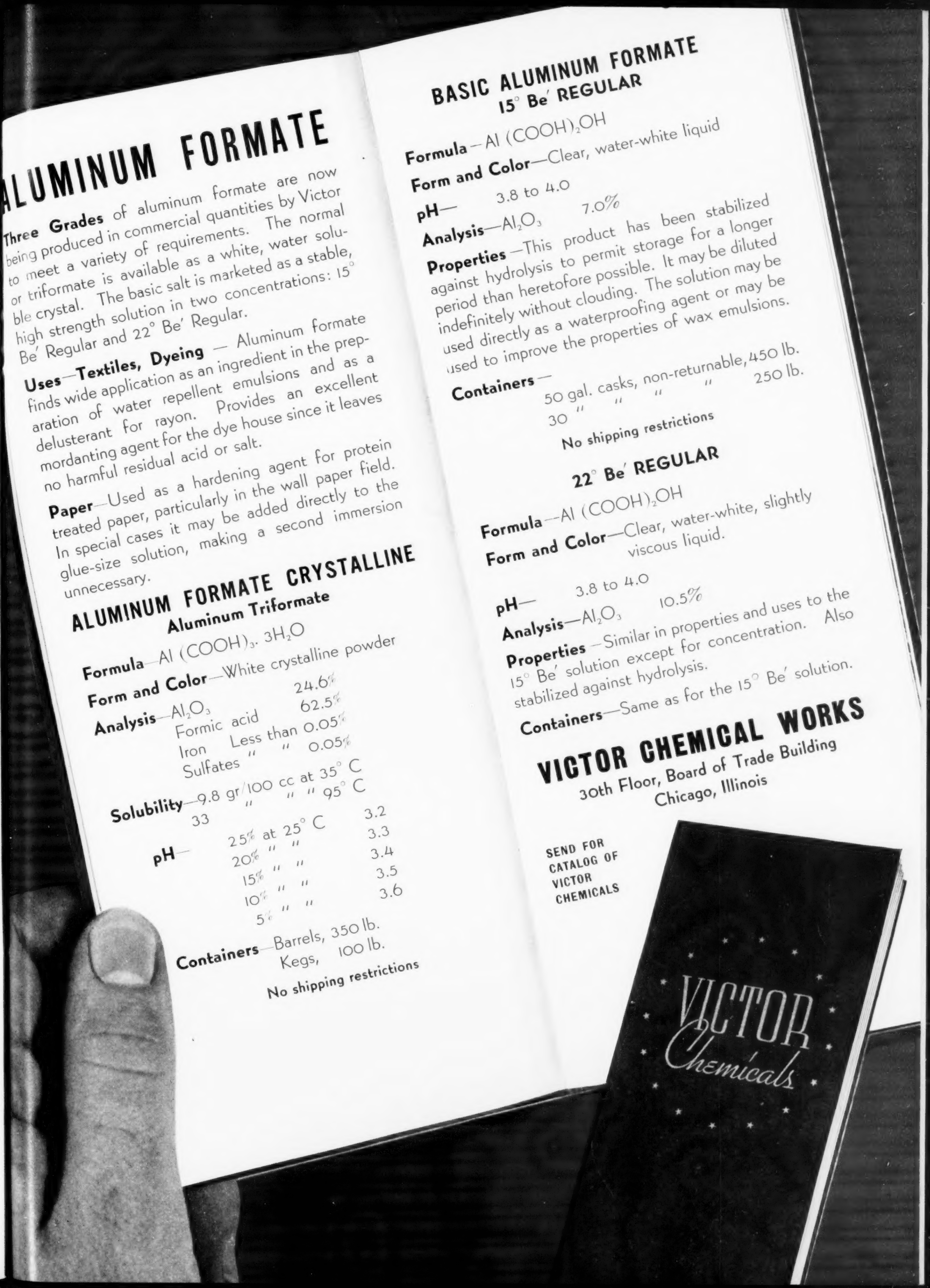
Annual Convention: The general meeting of the A.I.C., held at the N. Y. World's Fair on May 13, was exceptionally well attended. The problem of licensing chemists doing public consulting work, the debate on patents and the lure of the Fair itself were the principal attractions. Upper left, President Robert J. Moore, Bakelite; seated, Howard S. Neiman, secretary; lower left, Joseph W. E. Harrisson of the Philadelphia consulting firm of LaWall & Harrisson; below, Consultant James W. H. Randall; and right, W. J. Baeza, president, Industrial Research Co., N. Y. City.



Champion Bowlers: The accounting department team at Calco, winner of the Intraplant Bowling League. Rear row, left to right, O. M. Storholm, Thomas Worth, E. A. Lawrence, Joseph Burke, Clinton F. Simpson. Front row, left to right, David R. Evans, Jr., Harold Behl, Fred Daniels, captain; Edward Fisher, Leslie Van Nostrand.

15 Year Club: C. P. Gulick, chairman of the board, National Oil Products, Harrison, N. J., presents gold medals to employes at the Harrison plant who were eligible for membership. In addition to the medals, members of the 15 Year Club will receive one extra week's vacation. Announcement was teletyped to plants at Chicago, San Francisco, and Cedartown, Ga.





ALUMINUM FORMATE

Three Grades of aluminum formate are now being produced in commercial quantities by Victor to meet a variety of requirements. The normal or triformate is available as a white, water soluble crystal. The basic salt is marketed as a stable, high strength solution in two concentrations: 15° Be′ Regular and 22° Be′ Regular.

Uses—Textiles, Dyeing — Aluminum formate finds wide application as an ingredient in the preparation of water repellent emulsions and as a delusterant for rayon. Provides an excellent mordanting agent for the dye house since it leaves no harmful residual acid or salt.

Paper—Used as a hardening agent for protein treated paper, particularly in the wall paper field. In special cases it may be added directly to the glue-size solution, making a second immersion unnecessary.

ALUMINUM FORMATE CRYSTALLINE
Aluminum Triformate

Formula—Al $(COOH)_3 \cdot 3H_2O$

Form and Color—White crystalline powder

Analysis—

Al_2O_3	24.6%
Formic acid	62.5%
Iron Less than	0.05%
Sulfates " "	0.05%

Solubility—9.8 gr/100 cc at 35° C
33 " " " 95° C

pH—

25% at 25° C	3.2
20% " "	3.3
15% " "	3.4
10% " "	3.5
5% " "	3.6

Containers—Barrels, 350 lb.
Kegs, 100 lb.

No shipping restrictions

BASIC ALUMINUM FORMATE
15° Be′ REGULAR

Formula—Al $(COOH)_2OH$

Form and Color—Clear, water-white liquid

pH— 3.8 to 4.0

Analysis—Al_2O_3 7.0%

Properties—This product has been stabilized against hydrolysis to permit storage for a longer period than heretofore possible. It may be diluted indefinitely without clouding. The solution may be used directly as a waterproofing agent or may be used to improve the properties of wax emulsions.

Containers—
50 gal. casks, non-returnable, 450 lb.
30 " " " " 250 lb.

No shipping restrictions

22° Be′ REGULAR

Formula—Al $(COOH)_2OH$

Form and Color—Clear, water-white, slightly viscous liquid.

pH— 3.8 to 4.0

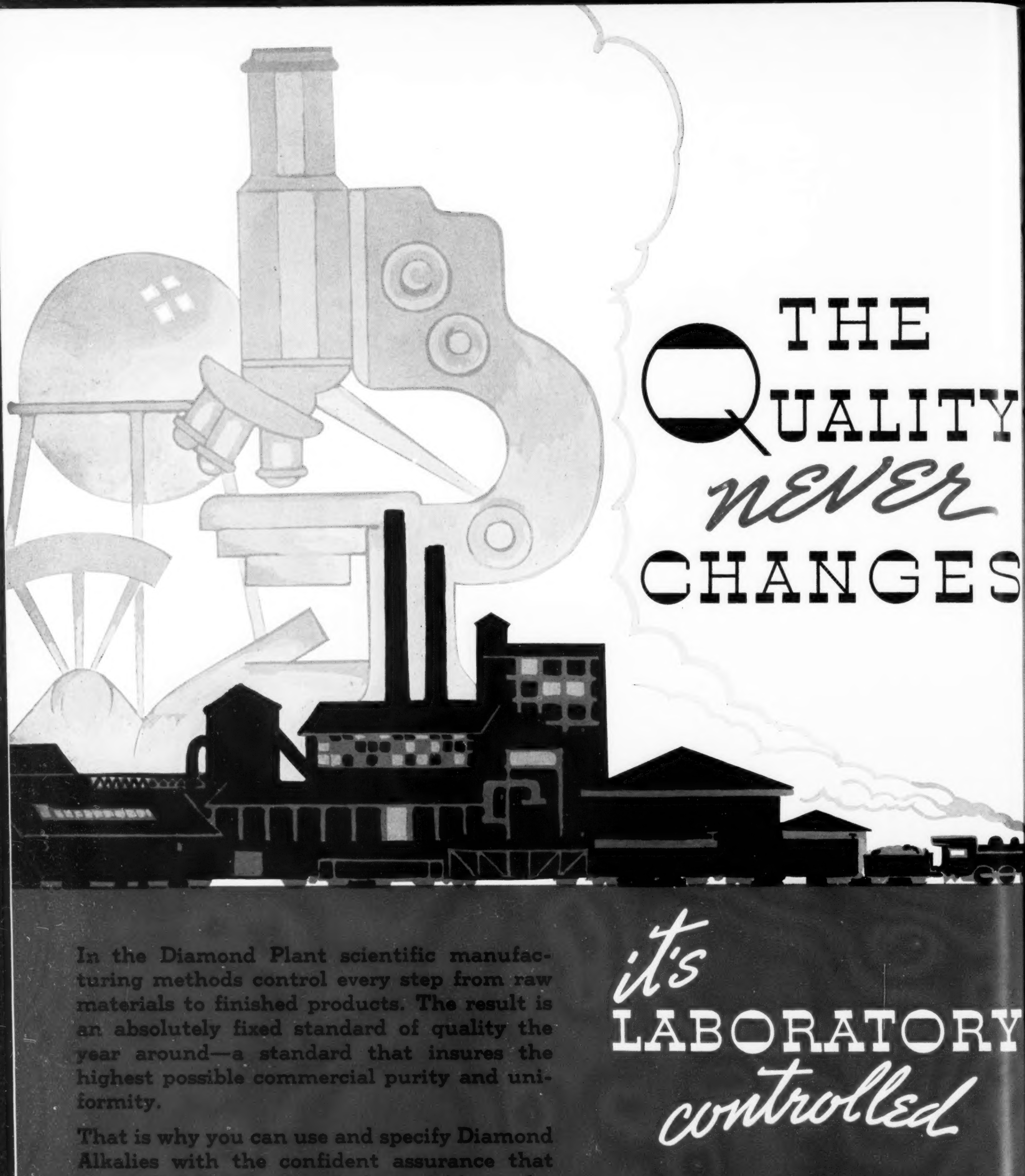
Analysis—Al_2O_3 10.5%

Properties—Similar in properties and uses to the 15° Be′ solution except for concentration. Also stabilized against hydrolysis.

Containers—Same as for the 15° Be′ solution.

VICTOR CHEMICAL WORKS
30th Floor, Board of Trade Building
Chicago, Illinois

SEND FOR CATALOG OF VICTOR CHEMICALS


THE QUALITY never CHANGES
In the Diamond Plant scientific manufacturing methods control every step from raw materials to finished products. The result is an absolutely fixed standard of quality the year around—a standard that insures the highest possible commercial purity and uniformity.
That is why you can use and specify Diamond Alkalies with the confident assurance that they will deliver uniformly dependable results in your process, month after month, with the exactness of a laboratory formula.
it's LABORATORY controlled
ALKALI
DIAMOND ALKALI CO.
PITTSBURGH and EVERYWHERE

Plant Operation and Management

A digest of new methods and plant equipment

Foremen Training at Calco

By C. H. Beek

At present nearly 400 employes of Calco Chemical Company, Bound Brook, N. J., a division of the American Cyanamid Company, are taking various courses of study offered by the company to better themselves for the work they are doing, as well as to prepare for possible future advancement. C. H. Beek, who has been in direct charge of the Calco Department of Training since 1936, describes the workings of the foremen training courses and the mutual advantages derived by employe and employer.

TRAINING is not new at Calco. For several years we have visited various colleges in search of chemical engineers to fill the need of a gradually expanding plant. Our type of business requires painstaking care and accuracy. It makes no difference whether the man is to be a salesman, chemist, or engineer. To us he is going to represent the company and must have the background, knowledge, and technique to serve the company and our customers efficiently.

These men, therefore, are given an intensive eighteen-months' course of training. They are assigned as helpers to all the crafts and divisions of the company, and write reports of their experiences. These are read by two executives and graded. In addition, professors from various colleges give instruction on such topics as: Industrial Engineering and Manufacture, Public Speaking, Psychology, English, and Report Writing. Every Saturday morning during this period, executives give lectures on the application of dyes, sales organization, production scheduling, industrial relations, etc. Reports, class achievement, ratings by divisional heads, form the basis for their retention or release. Although high standards are maintained, every assistance is given to develop the powers and abilities of these young men.

We have also had classes for chemists and foremen from time to time, but not until January, 1937, did Calco establish a Training Department to serve all employees of the company.

One of our greatest needs in the United States today is vocational training. In the late '20s it was almost impossible for a young man to get into the trades. The unions had no room for him. Employers were too busy to bother with apprentices. "Let the schools do it," was their answer, but the schools were hard pressed to pay the bills of general education. They did what they could, but it was very little.

After the depression, thousands of young men crowded the highways and byways in search of work. Industry didn't want them. The unions refused them, and the schools were unable to give them a program to meet their needs. Apparently the country wasn't interested in their welfare. When their problem became acute we did send some to CCC camps, gave others work on PWA, and put some on relief. This was just a palliative, a subsistence, not a constructive force in the building of self-respect and esteem. It resulted in a lot of "what's-the-use" individuals. Disgruntled, dissatisfied, unhappy, they didn't feel that our society had given them a square deal. As a result of all our muddled thinking and planning, we have today a severe shortage of skilled labor in the midst of a great surplus of laborers. If we are ever going to solve this problem, it must be by a closer cooperation between industry and the schools.

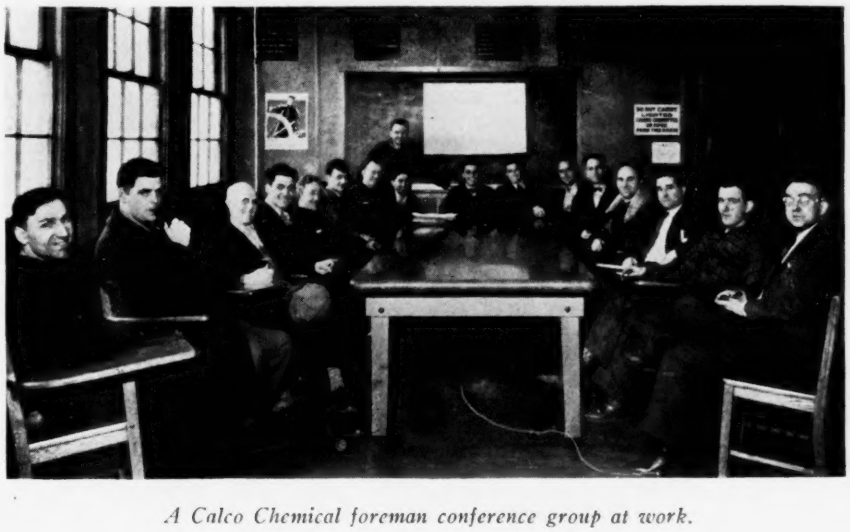
We do not claim anything original or unusual for work in training. We've had the friendly cooperation and assistance of many people, and are glad to pass on our experience with the hope that it may prove helpful to someone else.

Our training program is divided into three sections: (1) the apprentice training group, (2) the afternoon classes from 4:45 to 5:45, and (3) our foremanship training group.

Apprentice Training

In the past, a period of time rather than the achievement of efficiency was the criterion of trade mastery. During the early years of a man's apprenticeship he had simple jobs to do, such as sweeping the floor and running errands, and simple bench work. The opposition of trade unions and lack of interest on the part of employers, the appeal of a white-collar job, the recent depressions—have all contributed to the disintegration of apprentice systems.

Upon starting our apprentice training program, we experienced some difficulty because of the variety of preparation of the different men. Some had had algebra and quite a bit of mathematics; others had had none. Some had had



A Calco Chemical foreman conference group at work.

If your drums are equipped with Tri-Sure

● When all of your drums are equipped with Tri-Sure Closures you know that all of your product will be delivered—and in the same condition it left your plant.

Look at the Tri-Sure Seal and you'll see why. It is positively leak-proof. And it cannot be removed without deliberately destroying it.

This means that *not one drop* can be lost through leakage or pilferage; *not one drop* can be diluted or contaminated. It means that every Tri-Sure shipment is a safe shipment—safe for your product and prestige.

See the Tri-Sure exhibit in the Hall of Industrial Science, Chemicals and Plastics at New York's World Fair.

AMERICAN FLANGE & MANUFACTURING CO. INC.
30 Rockefeller Plaza, New York

Tri-Sure
DRUM CLOSURES

Make Every Shipment a Safe Shipment

Class in sheet metal layout work.

physics; others had not. During the first two years, we have been broadening the foundation for future work by giving courses in mathematics and physics to those who have not already had these subjects.

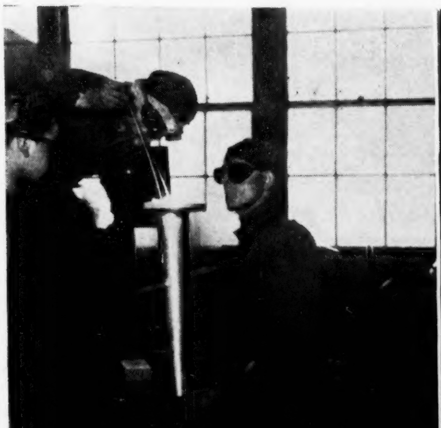
Our custom has been to send notices throughout the plant every year to inform the men that an apprentice group was about to start, and to invite those interested to report on a certain date for examinations. We also made a note of any likely young men who applied at the Employment Department, and notified them when the examination time arrived. Our first call produced 100 young men and they were given the Otis Intelligence, higher examination; O'Rourke aptitude test, and the Schorling and Clark arithmetic test. These tests are a help when considered as an aid to selection. If aptitude tests are considered as a rough measure of the boy's present performance and future potentialities and not a measure of his future accomplishments, they can help.

No executive is going to purchase a machine unless he has investigated its merits. Likewise, it is foolhardy and wasteful to hire a man for a particular job without first obtaining some knowledge of his aptitude and interest. Selection is important and the training of those selected is a continuous performance.

Although we believe that predictions based on high school marks, rank in class, rating of school would give us a fairly accurate estimate of the ability to comprehend related information, we wanted to make sure that these young men had the basic subject matter as well as the interest and aptitude for mechanical work. These boys are interviewed by the Director of Training and two foremen, and their ratings plus test results form the basis for selection of apprentices.

It is the job of the adviser to bring distastes and weakness to light, and explore the resources of the individual. He is alert to notice evidences of unusual ability. Is he a dreamer? A tinkerer? Does he have mechanical ability? Is he physically able? What has he done particularly well in the past? What are his hobbies? What have his friends suggested? What position does he want to fill ten years from now? All these are clues to be explored, and the technique used is to ask questions. The individual contributes the answers which are the data from which a decision will be made. He helps the boys to help themselves.

A boy's account of his attitude towards the trade, if made after observation and tryout, furnishes a satisfactory basis for estimating the possibility that he will like the occupation and find satisfaction in it. No decision to enter any particular trade will be required of him until he knows his own preferences



Left, in the welding shop—observation is the first step in training. Center, in the machine shop—the foreman checking the progress of an apprentice. Right, in the sheet metal shop—foreman and mechanic take a personal interest in the progress of apprentices.

with an assurance based on his experience in the occupation that has attracted him. It is the practice of Calco to rotate the boys through at least three shops, merely as a tryout period to help them decide the particular trade they desire to learn. Frequently, if they have made a pleasant contact and have been successful, they are inclined to remain. But this is only allowed after consideration by the Department of Training. We must be sure that his chances of success are good.

Ratings of the boys are received monthly from the foremen, and they are interviewed by a counsellor in order to be sure they

HARRY KLINE—B. N.

This man works here. Do you know that he started as an operator, was promoted to a foreman and is now general foreman. You see, he made his own "breaks."

He has a wife and some kids. In fact, he's a typical American workman, just like a lot of you fellows. He's like you in another respect—the taxes he pays definitely increase his cost of living.

Take the fellow in your shop who gets $18.00 a week, $960.00 a year. He pays $116.00 in hidden taxes. The rent he pays, the clothes he buys, food he eats, tobacco, gasoline—all carry hidden taxes. He can't duck them. He's got to live, so he cuts down on what he buys.

Do you get the point? If people don't buy, industry cuts down on production. Then what happens? Men are laid off, rates are cut. When industry can't sell, it doesn't produce.

Yes, sir—taxes hit all of us; you, the other fellow and your employer.

are being guided properly. Every endeavor is made to place the boy in the trade where he has the best chance of succeeding. A boy misplaced is apt to be maladjusted, and a troublesome worker later on. During this rotating period he is on trial, and is not finally accepted as an apprentice until he has demonstrated his ability and aptitude for the work.

Nearly all apprentices are high school or vocational school graduates. We put them to work in jobs where they can produce results to pay their way. It is not an enterprise in conducting a free trade school at the company's expense; rather, the company is paying fair wages and expecting them to earn their way, and is contributing theory and principles along with the practical training that go into mastering a trade.

The entrance rate of apprentices is 42½c per hour, and proceeds at regular increments of 2½c every six months until he has reached the rate of 61c at the end of three years. If for any reason he fails to do either the class work or shop work satisfactorily in any given period, no increase is granted for that period.

Helpers are those men who are employed as assistants to mechanics because of their experience in a particular craft. They may or may not have had the same educational background as apprentices. No helper will be promoted and classified as a mechanic until he can pass the same tests set up for apprentices. This in no way inhibits his chances of a promotion, for he has an equal opportunity to become a mechanic if he chooses to take up subject matter in the evening schools rather than in the plant in order to prepare for this test.

We had the boys but no one to teach them; so the next step was to approach several of our men and ask their assistance. We had a good supply of college men, a few of whom had some teaching experience, and from this group selected twenty men who were successful in their different fields, and who had the interest and personality to work well with men. They all willingly accepted an invitation to attend a course in some of the fundamentals of teaching. This course emphasized the advantages and disadvantages of different methods of instruction, the various steps in carrying out a teaching job and certain physical and psychological aspects of it. All of them gave at least one demonstration of a teaching job before the class. The teachers were willing to give their time gratis to assist their fellow workmen in their desire for knowledge. In fact, some of them enjoyed the work so much that they wanted to repeat the job the following year.

We began with one classroom two years ago and the demand has increased to such an extent that we now have four classrooms and 387 enrolled in courses. Before the end of the year this total will reach 450. Thirty-five of those enrolled are apprentices who report part on their time and part on company time for instruction. The rest are employees who report for the late afternoon classes, and the foremen conference groups which meet on company time. In addition to these courses, we have given the assistant foremen courses in human relations and job analysis. These men will have direct contact with the young apprentices in the plant. This is just a step to get them better prepared to handle these boys.

Late Afternoon Classes

After working hours the classrooms are open to all employees, and the following are some of the courses which we have given this year:

Elementary accounting	Blue print reading, I and II
Advanced accounting	Sheet metal lay-out
Elementary chemistry	Shop mathematics
Physical chemistry	Algebra
A. C. electricity	Practical mechanics
Business English	Industrial economics
Instrument testing	

Foremen Training

Last year we trained 12 men, largely supervisors and some foremen, in the technique of handling the conference method of instruction. During this year we have had 11 groups of foremen who are meeting with these leaders. There are approximately 120 men enrolled in these classes. Some of the topics which we have covered this year are as follows:

- What is business?
- What effect do taxes have on business?
- How is industry contributing to the American way of living?
- How does the cost of a product affect employment?
- How to handle human relations.
- The effective control of costs.
- How and where to prevent waste.

One of our objectives in presenting these topics for discussion is to give the men a picture of industry today, so that they will

have some facts and information upon which to base their opinions. We had experienced difficulty in getting men to talk at their meetings, and for this reason we have of late concentrated more on subject matter indirectly related to industry but still tied up with the particular work in which the individual is engaged. We find in this way that we are able to maintain interest in the subject, and there is a decided improvement in class participation. It's a matter of talking with foremen and not at them. The ultimate purpose of these meetings, of course, is to acquaint foremen with the problems and policies of the company so that they can correctly interpret them to their men. It's an opportunity for mutual thinking-out of common problems. They are aided in this by means of bulletins prepared by the Department of Training and placed on special boards reserved for this purpose in the various departments of the company.

After interviewing 200 to 300 young men during the past two years, we feel that they roughly fall into three groups:

(1) This group seemed rebellious with society and industry for not giving them work. When they get it, they continue to growl and complain. They have the attitude that they are all right and it is the world that is wrong. Some of these wanted a job but were reluctant to give all that the job demanded.

(2) Many left school voluntarily, others were discharged because they were not interested in the subject matter offered. They did not have a definite objective but wanted somebody to tell them what they should do.

(3) We did find a few, however, who were possessed of a desire to learn, to know, and to do.

It has been refreshing to note that despite the apparent lack of opportunity today there are young men who ask no favors of anybody. If they arrive, they expect to do it by their own sacrifices and labor. These young men are fine, sound, sensible fellows, who ask only a fighting chance to prove their worth. We wish there were many more of them, but are thankful for these evidences which it has been our pleasure to discover. They are vestiges of the American way to succeed. These are the men that are the backbone of industry as well as our democracy.

Business touches every angle of our lives. At play, asleep or at work we come in contact with business. People often mistakenly think of it as only affecting their work-a-day world. Very few ever think of it as having a soul—a social purpose. Any business worth its salt today recognizes that it has definite obligations to its employees. Any training program seeks to produce better equipped men with the view of improving the efficiency and output of its product and providing a reserved force of skilled men, but when it takes men and helps them to make the most of what God gave them, it's fulfilling a social purpose. Business is no longer a selfish tyrant to them, but a vital, pulsating force for good in their lives. Treat men as individuals, broaden their mental outlook, heighten their self-respect, assist them to improve their economic level and then let some soap-box orator endeavor to sell American Democracy short and see what happens. It just can't be done. You win men by a friendly development of their resources. Training does this and is, therefore, a large factor in the development of good will and loyalty.

Phenols from Cracked Petroleum Distillates

Phenols are extracted from cracked petroleum distillates in a process developed by the N.V. de Bataafsche Petroleum Mj., described in E. P. 499,709. The distillate is extracted with aqueous alkali metal hydroxide of 35-50% concentration, in sufficient amount to retain the phenols in solution. The alkali phenolate solution is freed from neutral oils by steam-distillation, and filtered to remove sludge; the filtrate is carbonated and the phenols removed by rapid distillation in a vacuum. Where thiophenols are present, these are preferably treated by air-oxidation below 90 deg. C. prior to carbonating; the disulfides formed may be removed by centrifuging, filtration, or extraction with a solvent. (*Chemical Trade Journal*, May 5, '39, p. 238.)

Furfural From Cottonseed

Furfural, an organic compound used in making deodorants, disinfectants, paint removers and preservatives, and xylose, a rare, non-fermentable wood sugar, may be produced commercially in large quantities in the near future from the hulls of cottonseed, according to a report to the Engineering Foundation, which is sponsoring research in cottonseed processing.

At present, cottonseed hulls are used principally as roughage feed for cattle, the report states. "However, laboratory methods have been worked out for the commercial recovery of xylose from cottonseed hulls by the National Bureau of Standards, and some work is in progress at the University of Tennessee toward the development of a practical method, and suitable machinery, for the recovery of furfural from the same source.

"Hulls have little feed value and must undersell grass hay to find a consuming outlet. They are frequently burned by the mills for power and process steam generation in sections where other fuels are relatively expensive. The heat value in British thermal units of a ton of cottonseed hulls is approximately 6,000 as compared to the value of one pound of coal being 2,000.

"The cottonseed hull is a lignin cellullose structure, which is the basic material of woody tissue, and which is common to most hulls or husks of seeds, nuts, and fruits.

Detecting Cl, Br and I in Solutions

A method of testing for presence of Cl, Br and I ions in any solution has been described by C. Duval and G. Mazars, *C.R. Acad. Sci., 207*, 862, and mentioned in *Chemical Age*, Jan. 28, '39, p. 60. A silver ferrocyanide test paper is made by dipping a sheet of ordinary silver citrate photographic paper into an aqueous solution of potassium ferrocyanide (10 grams per litre) for five minutes. The paper is washed with distilled water, then with silver nitrate to remove any traces of the potassium ferrocyanide. Another washing in distilled water is followed by dipping the paper into a 10 per cent. iron sulfate solution. The paper is then allowed to dry without being rinsed, and is stored in a dark place away from air.

A drop of the liquid to be tested is allowed to fall on the paper and if the solution contains Cl, Br or I ions the paper will turn green, then blue. Wash, and the blue spot persists. The presence of fluorides, cyanides, sulfocyanides or ferrocyanides will not affect the reaction. Chlorates, bromates and iodates will produce the same reaction. If the solution contains a phosphomolybdenum ion, the paper will be tinted with molybdenum blue; thiosulfates also give a blue coloration, but both of these can be removed by washing the test paper in acetic acid. Method is said to be very sensitive.

Three tests are made to determine which of the three ions Br, Cl and I is present. For the first, a drop of the solution under test is put on a square of silver citrate photographic paper and allowed to dry. Put the paper in a concentrated ammonia solution for five minutes, expose to light for one minute, and develop with hydroquinone. Bromides and iodides only will leave a black spot on a chamois colored ground. A second piece of silver citrate paper, stained with a drop of solution, is developed in a concentrated solution of normal ammonia. Chlorides and bromides leave a black spot, iodides do not. A sheet of silver bromide paper, stained with a drop of solution and developed with hydroquinone, will show a white or grayish spot if the solution contains chlorides or iodides, but not if it contains bromides.

Booklets & Catalogs

Chemicals

A34. by gum! third of a series of monthly looseleaf notes on current doings in the paint, varnish and lacquer fields. Reichhold Chemicals, Inc.
A35. Chrome Fast Yellow GD, Circ. No. 1585, describing a new dyestuff suitable for direct print and for color discharge upon textiles; a shade of good fastness, redder than "5GD." General Dyestuff Corp.
A36. Graphic Arts Supplies, Catalog No. 439; an attractive booklet describing a complete line of chemicals, equipment, and accessories for the printer and engraver. Phillips & Jacobs.
A37. "Green" Element, Manganese Sulfate, a folder prepared for the information of nurserymen, fruit and vegetable growers, and the truck farmer, containing data and suggestions for the application of manganese sulfate, as a valuable food, to fertilizer materials. The Tennessee Corp.
A38. List of Price Changes, issued by Schimmel & Co., Inc., effective May 18, 1939.
A39. Monsanto Plastics, a new edition of the beautifully executed brochure, 24 pp. in full color; although designed for the manufacturer and fabricator, it is of general interest and educational value; 12 pp. are devoted to acetate and styrene molding compounds. Monsanto Chemical Co.
A40. Price List, May '39, of Heyden Chemical Corp.; latest quotations on the fine chemicals and synthetic intermediates manufactured by this well-known house.
A41. Priorities, May '39, issue, featuring a summary of the history of radium; the front-page editorial is on a timely topic deserving of attention. Prior Chemical Corp.
A42. Properties and Uses of Porous Barium Oxide, as a laboratory desiccant of importance; also listed in this folder are a number of other fine barium chemicals that should be of interest to the research worker. Barium and Chemicals, Inc.
A43. Reprint, "Removal of Iron and Hardness from Water," issued by the Permutit Co.; a paper read before the New England Water Works Association, Sept. 16, 1938, by D. J. Saunders, Permutit Manager of Industrial Sales.
A44. Shell Organic Chemicals, handbook of data and uses for solvents useful to the varnish and lacquer manufacturer. R. W. Greeff & Co., Inc.
A45. Silicate P's & Q's, Vol. 19 No. 5; this month's topic has to do with the color signs in industrial water supplies, what they mean, and how the condition should be treated. Written with excellent sense of style, potentially interested inquirers are reminded that these leaflets come with triple perforation, ready for loose-leaf service. Philadelphia Quartz Co.
A46. Supranol Blue GG, Circ. No. 1611, announcing a new acid blue of good fastness, especially suitable for loose wool and slubbing, and blanket fabric. General Dyestuff Corp.
A47. Whitcombings, April, 1939; featuring the new printing inks "doctored" with industrial perfumes, with such an ink used for the printing of this edition; the publisher and printer, as well as the chemist, should find this issue important. Wishnick-Tumpeer, Inc.
A48. Wood Preserving News, May, '39, a well arranged monthly summary of recent events in wood construction and wood preservation fields. American Wood-Preservers' Association.

Equipment-Containers

E67. Bagology, April, 1939; recent edition of this chatty, conservatively-styled organ, whose features and editorials are worthy of attention. Chase Bag Co.
E68. Beach-Russ Type RP High-Vacuum Pump, Bulletin No. 72, illustrated leaflet describing rotary, single-stage pumps, for which are claimed high efficiency, economy of operation, noiseless function, simple and rugged design, and perfect lubrication. Beach-Russ Co.
E69. Ceco Pumps, pamphlet sketching a few of a very wide line of centrifugal pumps for acids and other corrosive liquids; equipment is custom-made of appropriate alloys to meet the specific requirements. Chemical Equipment Corp.
E70. Cyclotherm, illustrated folder describing a new boiler unit utilizing a cyclonic principle of combustion and heat transfer; capacities are to be had from 25 to 150 H.P., equipped for gas or oil firing. General Furnaces Corp.
E71. Dust Control, a 24-p. booklet, listing and describing various kinds of dust that can be collected by means of efficient dust control systems; illustrations, tables and diagrams are furnished for detailed descriptions of various systems. The W. W. Sly Mfg. Co.
E72. Electromet Review for June, containing some good photos of alloy steels in some unusual applications—food processing, metallurgical, decorative and other fields. Electro Metallurgical Co.
E73. Fire Chief Resistant Canvas, a leaflet illustrating applications of weather- and fire resistant materials to roofing and siding compositions. Wm. E. Hooper & Sons Co.
E74. G-M Comments, 11th issue, featuring the Univ. of Chicago's photoelectric spectrophotometer for quantitative analysis. G-M Labs. furnished the sensitive photoelectric cell, a special cesium-cesium oxide type with a plane fused quartz window. G-M Laboratories.
E75. Herco Bulletin, No. 205, brochure with illustrations and complete data on a series of hydrometers (Baumé, Twaddle, and other scales) having shatterproof bottoms; equipment includes designs for every use in the chemical industry. Wm. Hiergesell & Sons.
E76. "Industrial" Conductivity Bridge, illustrated bulletin describing Model "R. C." Bridge, and accessories for same. Industrial Instruments, Inc.
E77. Industrial Head and Eye Protection, a 48-p. booklet describing a wide line of safety equipment—respirators, goggles, welding helmets and the like—with special attention being given to the latest devices for safe work with ultra-violet and infra-red light and for over 300 harmful gases and dusts of every description. Chicago Eye Shield Co.
E78. Jeffrey General Catalog, No. 87, ready for distribution. Contains nearly 1,000 pages of information on material handling equipment, chains, gears, and many accessories, for both heavy and special industries. Jeffrey Mfg. Co.
E79. Kent Roller Mills, folder describing new model the junior size (9" by 22" rolls) of the "Super-5" type. Featured are the minimum number of controls necessary for fine adjustment, and handy shift from automatic to manual control of the feeder mechanisms. Kent Machine Works.
E80. The Laboratory, Vol. 10 No. 5. As usual, full of newsy items describing latest kinks in apparatus and chemicals of interest to the entire chemical industry. Profusely illustrated, this issue features an article on Charles Goodyear. Fisher Scientific Co.
E81. Leeds & Northrup Catalog EN-95, recent edition of the familiar catalog on apparatus for electrolytic conductivity measurements, as always a necessary item for the purchasing agent and research worker, and a valuable work in itself. Leeds & Northrup Co.
E82. Link-Belt General Catalog, No. 800, the largest and most complete listing of this company's comprehensive line of equipment and accessories. Link-Belt Co.
E83. Link-Belt News, May-June, 1939. 12-p. rotogravure history of the L-B organization, printed especially for distribution at its N. Y. "World's Fair" exhibit. The Link-Belt Co.
E84. Machinery for Wood Preservation, 28 pp. of beautifully printed and illustrated material, describing new apparatus and processes for the handling and preservation of lumber, timber and other natural wood products. Allis-Chalmers Mfg. Co.
E85. Moline Chain Catalog, just out, gives complete listings and new prices of malleable and combination chains and chain attachments. Moline Malleable Iron Co.
E86. Nickel Cast Iron News, Vol. 10 No. 3. Featured this month are machine tools and intricate castings, fabricated of nickel-alloyed iron and steel. International Nickel Co., Inc.
E87. Nickel and Nickel-Base Alloys, another in the series of valuable treatises (Bulletin T-13), this describes the fabrication of nickel materials in the design of corrosion-resistant machinery for both heavy and light service. Pamphlet is one of the looseleaf technical series, and is not to be passed up. International Nickel Co., Inc.
E88. Permutit Expansible Strainer Head, leaflet describing and illustrating a strainer head for filter and softener under-drain systems. Head will not clog, it is said, and contains a self-adjusting flapper plate to provide adequate port openings for streams of variable flow rate. The Permutit Co.
E89. Process Industries Quarterly, first quarter, 1939. Review of recent applications of nickel and nickel alloys to industry, with illustrated features on the petroleum industry, heavy chemical, soap, plastics and other fields. International Nickel Co., Inc.
E90. Schaffer Poidometer, folder illustrating feeder-weigher-conveyor apparatus and systems for solids and liquids; portable models especially useful in the processing industries. Schaffer Poidometer Co.
E91. "Weber Jr." Batch-Type Lime Hydrators, Bulletin No. 14-A folder describing 2-ton per hour models intended for small lime plants. Arnold & Weigel, Inc.
E92. Westinghouse Small-Plant and Industrial D-C Switchboards. Looseleaf Data Sheets 31-132 and 31-133; profusely illustrated with detailed wiring and lay-out charts and diagrams, with accompanying tables of characteristics. Westinghouse Electric & Mfg. Co.

Chemical Industries
522 5th Avenue
New York City

I would like to receive the following booklets; specify by number: ....

Name ....
Title ....
Company ....
Address ....

All information requested above *must* be given to receive attention.

Porous Carbon Electrodes

Porous electrodes, through which reactants may be admitted to or products withdrawn from a cell, offer attractive possibilities in electrolytic work, according to a paper read recently before the general meeting of the Electrochemical Society at Columbus, O., by Dr. George W. Heise of National Carbon's Research Laboratories.

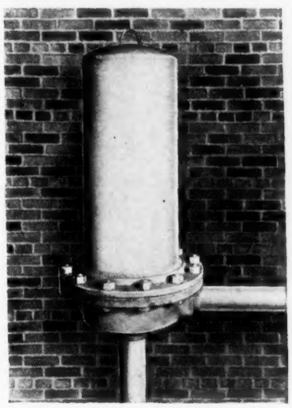
Offering a means for the elimination of diaphragms, reduction of power consumption, and continuous operation, the porous electrode has already proved useful in the laboratory, in the preparation of permanganate from potassium manganate, of ferricyanide from ferrocyanide, and in the electrolysis of brines. Organic oxidation-reduction reactions are readily carried out, said Dr. Heise; numerous nitro-derivatives are conveniently reduced in a cell fitted with such electrodes. The wicking action of the carbon electrode makes possible the direct admission within the core of such immiscible liquids as nitro-benzene, which is reduced on the outer surface of contact with the aqueous reducing medium; similar reactions may be obtained with reactants lighter than water (e.g., benzene or toluene) or with molten materials, such as naphthalene.

The use of such porous electrodes is limited to solutions containing no suspended matter which might clog the pores and interfere with the maintenance of flow rate; generally, the electrode material must be selected according to the nature of the desired operation, if freedom from side reactions (e.g., attack on the electrode by halogens or oxygen), and long life for the material are to be desired.

New Equipment

Odor Absorber QC 14

A new odor adsorber for removing all types of odors such as oil vapors, fermentation vapors and other objectionable gases from compressed air lines has been announced by a prominent manufacturer of industrial equipment.



The unit is an auxiliary airstream "filter" of activated coconut shell carbon. This type of carbon is one of the most active commercial adsorption agents known, and will adsorb odors up to 15-20% of its own weight. It is reported to remove odors and vapors which cannot be stopped by the usual condensers, separators or aftercoolers. The unit shown has a compressed air capacity of 175 c.f.m.

Elecdropode QC 15

The Elecdropode is a new analytical instrument designed by one of the best-known supply houses; with it both qualitative and quantitative analyses can be conducted in organic and inorganic chemistry.

The Elecdropode offers the laboratorian a convenient method for the measurement of current-potential in a special type of electrolytic cell. The electrode comprises a fine glass capillary and means for supplying mercury to it (the so-called dropping mercury electrode). One valuable feature of the Elecdropode is the small amount of dilute solution with which determinations can be made; it works best in the range 0.01 to 0.00001 equivalents per liter; under special conditions measurements have been made with as little as 0.005 cc. of solution. The sample is not changed, and is still available for further analysis after use.

The equipment is completely self-contained, assembled in a case fitted with a Bakelite panel on which are mounted the controls and dials; to operate, only connection to 110-volt, 60-cycle A. C. is necessary.

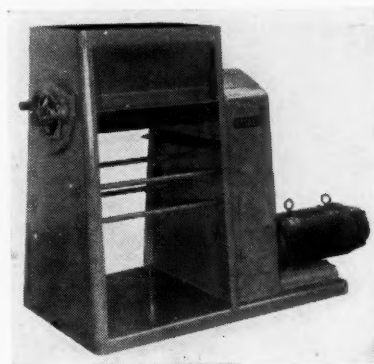
Photo-Electric Reflectometer QC 16

A new photo-electric reflectometer is being marketed and it is claimed that the new device is 5 to 10 times greater in sensitivity than older models. Instrument is used for measurements of sugar, starch pencil lead, paper, linen, ceramics, flour, limestones, cosmetic powders, etc., where determination of very minute differences in shade is important.

The extreme sensitivity (5 to 10 times greater than older models) eliminates errors due to observer's visual acuity. A built-in compensating circuit accounts for the increased sensitivity. Because of this circuit, the manufacturer states that it is possible to set the instrument on 0, when the photo-electric reflection cell is placed on white or other light color standard. Thus, the instrument registers complete blackness or the darkest shade when set on 100 of the scale. Therefore, the contents of gray or differences in shade can be read directly from the micro-ammeter, permitting visual reading of very minute differences. Greater than normal sensitivity can be obtained.

Oscillating Granulator QC 17

The oscillating granulator shown is a new and larger machine of the automatic screen type developed by one of the large manufacturers of processing equipment. It may be used for granulating dried crystal masses, processing filter-press cake both before and after drying, breaking down materials caked in storage, preparing wet mixtures for drying, breaking up compressed slugs for debulking operations and for a variety of similar operations. It is a continuous production machine with high output, up to 2,000 lb. per hour, compact, with built-in motor, heavy welded construction, large bearings well lubricated without danger of contaminating processed materials, smooth and quiet in operation. Dust-tight discharge hopper can be furnished. Machines of similar type are built in several sizes and in special metals.



Advantages of this type of granulator are:—greatly improved screen analysis of granules produced, ease with which screens can be changed, easy cleaning, wide adaptability for granulating chemicals, foods, pharmaceuticals, waxes and many other preparations, low-cost operation and high-production rates.

Safety Siphon QC 18

The T. P. C. Siphon is a simple and efficient device for discharging the contents of carboys, drums and barrels. It consists of a special acid-resistant tube, to which is attached a priming bulb, visual priming chamber, special composition flexible hose and a flow control valve. Once the siphon is inserted, the flow valve is closed and the priming bulb flexed until liquid shows in the chamber. By adjusting the control valve, a regulated flow of liquid, from a trickle to 6 gallons per minute, may be delivered Flow is automatic.

Only one man is required to operate the siphon, which works on the vacuum principle. It minimizes dangers of fumes, burns, spilling and splashing; discharges completely without tilting the container. Models are available for every type of acid.

Chemical Industries
522 Fifth Ave., N. Y. City.

I would like to receive more detailed information on the following equipment: (Kindly check those desired.)

QC 14	QC 17
" 15	" 18
" 16	

Name ....

Title .... Company ....

Address

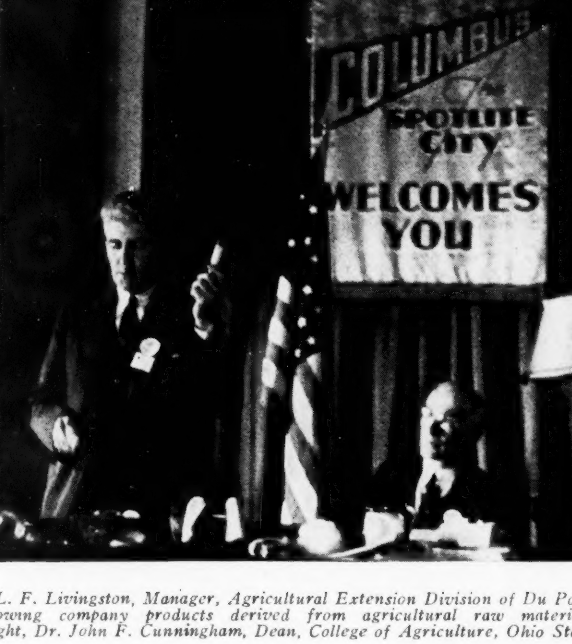
New Chemicals for Industry

A digest of products and processes

CHEMURGY

As an Industrialist Sees it

L. F. Livingston's paper delivered before the Mid-American Chemurgic Conference of Agriculture, Industry and Science, held at Columbus, Ohio, May 19 and 20, was so enthusiastically received by agriculturist and industrialist alike and is such a clear, concise, and informative statement of the industrialist's point of view that permission was immediately sought from the author and the National Farm Chemurgic Council to present it to CHEMICAL INDUSTRIES' readers. The disparity in the advances made by industry and agriculture over the last two decades is directly the result of the much smaller amount spent by the latter on vital research projects.



L. F. Livingston, Manager, Agricultural Extension Division of Du Pont, showing company products derived from agricultural raw materials. Right, Dr. John F. Cunningham, Dean, College of Agriculture, Ohio State.

SCIENCE in the chemurgic movement to me means research—so a better title for this discussion might be "Research Serves Us All." I consider it a privilege and an opportunity to let you know some facts which I have about research, and to tell you some obvious conclusions derived from those facts.

Fact No. 1. The Du Pont Company and the chemical industry as a whole spends between two per cent. and three per cent. of their annual sales receipts on research.

Fact No. 2. All manufacturing industry spends about one-half of one per cent. of the value of goods sold, in research.

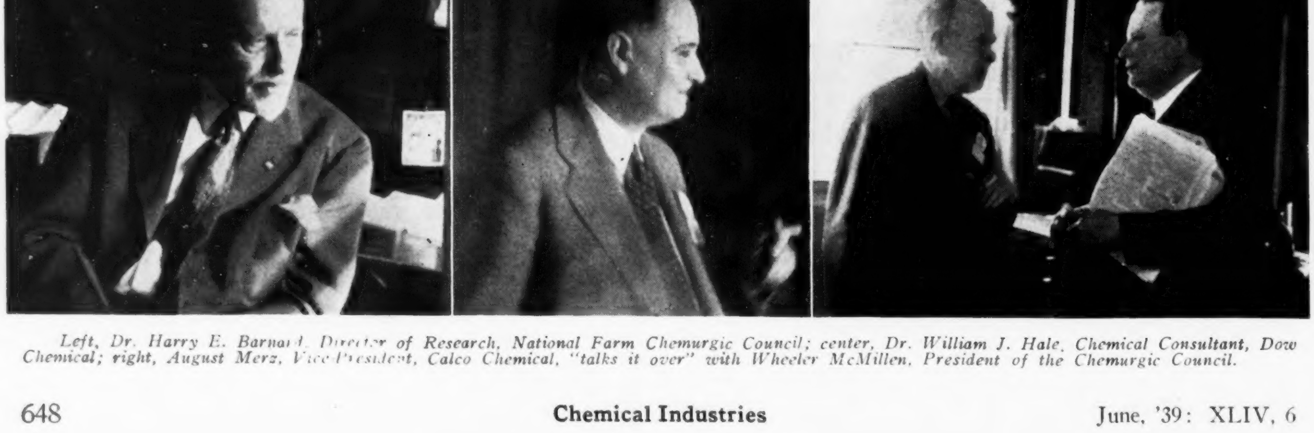
Fact No. 3. Agriculture spends only one-seventh of one per cent. of the value of its products on research.

Conclusion No. 1. Industry has learned that research pays dividends.

Conclusion No. 2. Agriculture has lagged behind and must catch up.

As I said, agriculture spends about one-seventh of one per cent. of the money received for agricultural products on research. This amount includes all the money spent by the Federal Government on agricultural research and all the money spent by the States on experiment station research. It includes also the recent appropriations for the four-million-dollar regional laboratories which are starting to work on the use of surplus agricultural raw materials, and of which we are all very proud.

To put agriculture on an equal footing with industry in research effort would require the expenditure of three and one-half times the present agricultural research budget. I know that some will think this is excessive, but I am convinced that those who think so are wrong.



Left, Dr. Harry E. Barnard, Director of Research, National Farm Chemurgic Council; center, Dr. William J. Hale, Chemical Consultant, Dow Chemical; right, August Merz, Vice-President, Calco Chemical, "talks it over" with Wheeler McMillen, President of the Chemurgic Council.

When progressive business men, such as I know the Du Pont executives to be, are willing to spend $7,000,000 annually on research; when they see a profit in so doing; and when that amount in relation to Du Pont sales is twenty times greater than the amount spent by agriculture in relation to its sales, I feel justified in saying that the total agricultural research funds are woefully inadequate.

It is well known that the piling up of surplus upon surplus in our country, and the uneven distribution of purchasing power in rural America has unsettled all economic stability and may threaten domestic security.

True Wealth Consists of Goods

The remedy, some believe, is to restrict production, relying on artificial scarcity to maintain a high price level. They do not, or will not, consider that true wealth consists of goods, not money. They fail to realize that the less goods produced, the less wealth is available for distribution.

Men of science, on the other hand, propose to increase production and wealth, and by the development of new perpetual organic sources of raw materials they plan to distribute the wealth which they have created more broadly and more evenly.

Millions upon millions have been spent for our farmers, much of it admittedly for temporary relief. Some of it, like the erosion control payments will be of permanent benefit.

I do not support or condemn these programs. I do know, however, that I am justified in stating that, if a portion of the funds now being spent were transferred to research so that agricultural research would be more nearly on a par with industrial research, a greater permanent benefit would obtain.

Why has this not been done before? That question is easy to answer. It requires the Du Pont Company, and presumably other companies, an average of six years to carry a research project from test-tube to completed product; quite frequently ten or more years are needed. Government and State experiment stations can hardly expect to do better.

It is because of the length of time required to produce results that experiment stations have always had trouble getting financial support. However, the situation is much better than it was, largely through the efforts of the Farm Chemurgic Movement. With an ever increasing appreciation on the part of the people of the permanent value of research, those who control the purse strings will in time be glad to give agricultural research the financial backing it deserves. Even now, four regional laboratories are starting experimental work which is directed at increasing the consumption of surplus crops.

The next move, I believe, is to obtain more adequate support for work in State experiment stations. If two and one-half million dollars were set aside it would add $50,000 to the working fund of each station. That fund should have no strings attached to it other than it should be used for research in the interest of the industrial use of agricultural crops.

Up to this point, it might appear that I am laying the entire burden on State and Federal legislators, but such is farthest from my intention. I believe every farm organization has a duty to perform in this movement which only a few have accepted.

There should be a great number of fellowships and individual research projects backed and paid for by the farm organizations.

This has been done for years by many industries who have financed research projects in various universities along lines which they hope will be to their benefit. Why should not the corn growers, to mention one branch of agriculture, support special projects having to do with increased industrial use of corn or corn-stalks?

One of the primary difficulties in using corn-stalks is not chemical but the moving of them from the field to the factory. Some of the specific problems are—"Can they be used in a compact form?" "If so, what should that form be?" "What is the best equipment to put them into the required form?" "Should it be portable?" "What are the economics of the entire proposition?"

These are not industrial problems. They are farm problems; problems of the man who has something to sell.

Industry is the buyer and agriculture is the seller. The wise seller brings his product to the market in the most attractive form possible in order to obtain the highest price possible. He gets the price because the product is in the form most useful for the buyer. It is because of these fundamentals that I believe farm organizations can profit by supporting research work dealing with their own problems.

The Du Pont Company now buys products which started on the farm in vast quantities. A year's supply for their plants would require 22,000 5-ton trucks which would stretch along a highway for 100 miles.

Please note that I said products from farm crops, not the farm crops themselves. Many other chemical industries are in the same position.

The volume of raw materials which the chemical industry of the country can consume will be greatly increased whenever the seller (the farmer) can bring his products to the factories in more suitable form and at a price which the chemist can economically pay. Remember, American industry wants to buy from the American farmer, but I maintain there is a farm research job which it will pay agriculture to perform.

Continuous Bleaching Process

A new continuous bleaching process for textiles, employing peroxide as the basic reagent, has been announced by The R. & H. Chemicals Dept. of Du Pont.

The process has been successfully applied to cotton piece-goods lighter than sheeting. Market whites, dye-bottoms and colored yarn materials are handled with equal versatility. On a wide range of fabrics, the results are characteristic of the highest qualities of uniform and permanent whiteness, absorbency, mote removal, cuprammonium viscosity and retention of fabric construction.

The process is extremely simple. The goods are first saturated in rope form with the bleaching solution, passed continuously through a specially designed heating tube into a J-Box, where sufficient reaction time is allowed. From that point the material is pulled through the usual type of plant washer on the way to the white bins.

Previous attempts to bleach continuously have failed largely because the conceptions of the inventors could only be projected to mill scale by constructing huge and cumbersome equipment. Moreover, close control has been difficult or impossible. The Du Pont process, in contrast, lends itself to even closer control than batch methods now practised commercially.

Early in their work, Du Pont chemists erected portable semi-continuous equipment in one finishing plant after another, bleaching a variety of goods. Recently a completely continuous unit of production size has been operated with excellent results in a prominent New England mill.

The bleaching unit consists of an upright stainless steel chamber constructed in such a manner that very efficient utilization of chemicals is obtained. Savings in steam, water and labor are assured. The small required floor space makes it possible for a bleachery to increase its output. In fact a production line schedule now may become a reality.

The speed with which the goods can be turned from the grey state into finished material ready for shipment is a notable feature. Processing time can be reduced by a day or two depending on the existing plant facilities, because only one to five hours are required to pass the goods from desize or sour to the white bins. Quicker deliveries can be made to the customer.

Process and equipment patent coverage has been applied for. The new equipment will be constructed by manufacturers of textile finishing machinery.

New Products

Organic Water Softeners Two organic water softeners, Nullapon A and Nullapon B, have been developed by General Dyestuff Corp., 435 Hudson St., New York City. These products are said to not only prevent the formation of lime soap, but also to re-dissolve lime soap and difficultly soluble compounds of metal soaps, carbonates and hydroxides precipitated on the fibre. In addition to this they are useful for such purposes as removal of copper or manganese from fabrics and for clearing the yellowish tint caused by the presence of iron in white goods.

Tube Drawing Compound Nopco No. 2261 Tube Drawing Compound, new development of Nopco Labs., Harrison, N. J., is a stable paste compound of high titre fats. Is readily soluble and is formulated specifically for the lubrication of heavy draws in the wet working of copper and brass tubes, particularly where large reductions are made. Is effective in 5% solution. Product is also recommended as a lubricant for drawing heavy brass and copper shells. Because it consists primarily of vegetable fats, it is not subject to development of odor or rancidity on drawn stock.

"Ruggedwear" Floor Resurfacer With the addition of Montmorillonite to increase coverage capacity per pound, Ruggedwear Resurfacer, popular floor repair material made by Flexrock Co., Phila., Pa., has undergone its second major improvement within five years. Montmorillonite is composed of manganese, silica, alumina and iron. It produces an easier mixture with cement, sand and stone, thus decreasing labor costs, while increasing the toughness of the product and making it particularly suitable for "feather edge" concrete repairs. When used as a ½ inch topping over concrete, Ruggedwear Resurfacer stands up well, it is claimed, under severe industrial conditions.

Baking Enamel The outstanding characteristic of Low-Bake "Dulux" enamel for industrial finishing, just announced by du Pont, is that it speeds up production in low-temperature ovens, affording the following baking schedules: One quarter hour at 250° F.; one-half hour at 225° F.; one hour at 200° F.; two hours at 175° F. New finish has demonstrated excellent gloss and build, print resistance, and retained flexibility. Is said to be wrinkle-proof under all normal conditions, and gives satisfactory hiding in one coat when applied on solvent-cleaned steel, bonderited steel or primed steel.

Nickel Electroplate Hanson-Van Winkle-Munning Co., Matawan, N. J., has perfected a new soft, semi-bright nickel alloy electroplate. The coating is said to be nearly as bright as typical bright nickel, but possesses a more desirable flow characteristic when under pressure on a buff. Deposit is claimed to be extremely ductile, without risk of flaking or peeling, and to be directly applicable with good adherence, even to iron or steel.

Paraffin Wax Conversion Paraffin waxes are being converted into fatty acids by a process now on a large-scale basis in Germany. Natural or by-product wax materials are converted by oxygen or oxygen-enriched air, in the presence of a catalyst, to mixtures of fatty acid materials; among the final products obtained in a representative run are capric, pelargonic, lauric, undecanic and other acids containing from 10 to 18 carbon atoms or of even greater M.W.

For practical purposes, the acid mixture is saponified and unsaponifiable residues are returned to the reaction process; the process is said to be sensitive to minor changes in operating conditions, and requires considerable care and highly efficient plant. (Mentioned in *Chemical Trade Journal*, Apr. 28, '39, p. 402.)

Acetylene Gas for Fruit Ripening Acetylene gas has been used successfully in the Union of South Africa to hasten the ripening of several kinds of fruits including tomatoes, oranges, bananas, peaches, and plums, according to a report from the office of the American Commercial Attache at Johannesburg to the Chemical Division, Department of Commerce.

Experiments which were conducted by the Senior Fruit Inspector of the Union involved the use of one per cent. acetylene gas in an atmosphere at 21 degrees centigrade. Green plums were made to ripen completely in 5 days, tomatoes were ripened ten days in advance of the normal date, and the ripening of bananas has been speeded up considerably. Fruits treated with acetylene gas begin to show a healthy tint in 24 hours and are said to be sweeter than fruits allowed to ripen in the ordinary way.

Colloidal Sulfur A dry dispersible sulfur preparation, a Du Pont product, is obtained by mixing an aqueous sulfur paste with a water-soluble carbohydrate such as cane sugar, dextrin, glucose, or dextrose, drying the mixture under reduced pressure at a temperature not exceeding 65 deg. C., and comminuting the dried product. (Mentioned in *Chemical Trade Journal*, Apr. 28, '39, p. 414.)

Textile Lubricants Esters for use as textile lubricants include suitable fully esterified synthetic esters of the following groups: a monohydric alcohol and an unsaturated acid, polymerized and/or oxidized; a monohydric alcohol and a polymerized and/or oxidized unsaturated fatty acid; di- and trihydric alcohols may likewise be esterified; in all cases, the acids contain 8 or more carbon atoms. Lister and Co., Ltd., according to E. P. 487,949 (1936) mentioned in *Chemical Trade Journal*, Apr. 28, '39, p. 414, have placed on the market such a lubricant, the methylcyclohexanol ester of oleic acid which has been oxidised and slightly polymerized by the application of heat.

Germicidal Soaps Deutsche Hydrierwerke A. G. has developed a series of water-soluble germicidal agents, comprising soaps of fatty acids (6 to 12 carbon atoms) together with chlorinated aromatic hydroxy compounds. The use of the lower fatty acids is said to enhance the activity of the other ingredients in aqueous dispersion. (*Chemical Trade Journal*, May 5, '39, p. 463.)

Linoleum Substitute A new type floor covering developed in Germany promises to reduce the country's consumption of linseed oil, which heretofore has been imported in considerable quantities for the manufacture of linoleum floor coverings, according to reports from the American Consulate General at Frankfort-on-Main, made public by the Chemical Division, Department of Commerce.

The new floor covering is a plastic product of acetylene origin which resembles linoleum not only in appearance but in its heat and sound insulation properties and can be processed with the same equipment used for the manufacture of linoleum, the report said.

Month's New Dyes General Dyestuff announces:—Supranol Blue GG, an acid blue of excellent fastness to light, and to wearing and processing. Its fastness to milling, carbonizing, stoving, sea-water, and perspiration makes the product suitable for loose wool and blankets. It dyes well both from neutral and weakly acid baths.

Chrome Fast Yellow GD is recommended for direct prints and color discharges on vegetable, animal and artificial fibres, as well as on mixed fabrics. The shade has good fastness to light and washing; by adding Dissolving Salt C, a good fixation is obtained in rapid aging of eight minutes.

Chemical Specialties for Industry

A digest of new uses and new compounds

The Formulation of

Household Disinfectants

By Charles F. Mason, Ph. D.

THE problem of germ, fungi, insect and rodent extermination has received ever-increasing attention from biologists, chemists and medical men for the last eighty years. Pasteur laid the foundations of bacteriology, and investigators in his wake have tested countless compounds and combinations of compounds for their power of exterminating pests. For a number of years combinations were used and from superficial examination of results were satisfactory to a degree, but no measuring device was available by which one product could be compared to another until Koch contributed a method of making pure cultures and, shortly afterward, The Rideal Walker test was established.

This test is still a standard in spite of many criticisms, which instead of substituting or displacing it altogether have aided in making its manipulation more uniform and results from different experimenters upon the same product are now in agreement. In fact the test is in a stronger position than before and is generally accepted. A few results picked at random are listed below to illustrate the growth inhibition of different chemicals upon *bacillus typhosus* compared to phenol as a standard.

Cinnamic acid	30
Thymol	25
Camphor	6
Salicylic acid	6
Quinone Sulfate	3
Phenol	1
Sodium Salicylate	0.06
Boric acid	0.01

Obviously, cinnamic acid is thirty times more destructive than phenol and three thousand times more destructive than boric acid. Since this test was adopted, other compounds like cresols and xylenols have been found to have super-superior properties to phenol and the retention of the latter as a standard in a series of measurements is not to be implied as approval of its fitness for general use. Its slight solubility, toxic action, and corrosiveness were causes for its displacement for general use.

As a result of steady progress the field is today very broad and the above title "Household Disinfectants" may appear ambiguous, when one considers the varying demands in homes ranging from primitive rural districts to crowded urban centers, but it is only an attempt to describe the physical properties and chemical composition of the generally accepted types used in isolated houses, hotels and apartments. They are purchasable in drug, paint, hardware, mail order and sundry stores and in the majority of cases have been packaged by jobbers who, in the case of liquids, dilute a concentrate with a solvent, and in the case of solids package directly.

An exception to this method of distribution is the group of sprays packaged by large petroleum companies and distributed directly for the economic advantages of wider consumption of petroleum distillates without middlemen's profits, and for avoidance of the possibility of adulterating. The opportunities for adulteration by the packager are restricted only by his own conscience and the bureaus, which from time to time purchase and test for lethal action.

To date, the exterminants in general have been classified according to the methods of application and the type of pest to be exterminated. One group is listed below.

1. Fumigants
2. Fungicides
3. Insecticides
4. Sprays
5. Soaps (germicidal)
6. Dips
7. Sweeping compounds
8. Urinal blocks

It is obvious, that this method is arbitrary, in that sprays which usually mean solutions sprayed upon trees and plants also include insecticides applied by spraying in the home to exterminate flies and upon the farm for any pests that disturb animals. Fumigants imply those applied in gaseous form or in the form of gas-evolving liquids and they are also fungicides and insecticides.

In commerce the trade names are equally arbitrary and in fact ambiguous, a few of which are insect powder, fly spray, roach and ant powder, moth blocks, germicidal soaps, rat and mice exterminants, sulfur candles and moth proofed garment bags. To meet these commercial needs more than two hundred separate and distinct chemical compounds have been prepared, tested, and reported upon relative to growth inhibition and lethal power to lower and higher animals.

One of the oldest household disinfectants, which is also a bleach and even a solvent for silk, wool, and hair when not diluted, is Javelle water. It kills many kinds of organisms in three to five minutes. It is a mixture of sodium hydroxide and sodium hypochlorite in two to five per cent. water solution and in spite of its disadvantages and the competition of more satisfactory ones is still sold in large quantities.

Another is formaldehyde, which has been sold in many forms ranging from dilute solutions through viscous suspensions to blocks and mixtures, which evolve the vapors when treated with water or chemicals under set conditions. One example is:

Paraformaldehyde	18 parts
Barium Peroxide	40
Water	42

The two solids are intimately mixed and sold in one container with instructions for the addition of water just before use in a closed room, where the formaldehyde vapors will have time to penetrate and act. It is based upon the principle that the heat evolved by the action of barium peroxide upon water will vaporize formaldehyde. Tests upon the penetrating power of the gas have proven that three fluid ounces of this mixture per one hundred five cubic feet of room space generate sufficient to penetrate ten layers of flannel in three and one-half hours.

Another example is:—

Formaldehyde	17 parts
Water	73
Lime (unhydrated)	8
Potassium permanganate	2

The formaldehyde and water comprise a solution, which is sold in one container; the lime and potassium permanganate after intimate mixing are sold in another. The two are mixed just before use in a closed room as above. Formaldehyde when molded into spheres or briquettes, exerts an inhibiting action upon pests in clothing but is inferior to the above gas generating mixtures.

The term "sulfur candles" is misleading in that many contain no sulfur at all, and the danger of fire and suffocation has prompted many cities and states to prohibit their sale. However a demand still exists even in the cities and one example is given below.

Stearic acid	20 parts
Paraffin	40
Paraformaldehyde	20

The stearic acid and paraffin are melted in a container by hot water or steam heat and, after thorough mixing and cooling to the pouring consistency, the paraformaldehyde is stirred in rapidly and poured into water-cooled molds to avoid loss by evaporation.

Fly Spray Formulation

Fly sprays are either a three per cent. solution of pyrethrum extract in a light petroleum distillate or one of the very recently introduced aliphatic thiocyanates in the same concentration of the same solvent. These, judging by recent biological tests possess a higher knock-down and killing power than pyrethrum with the added advantage of pleasant odor and absence of stains.

Sweeping compounds are upon the borderline of disinfectants even though exterminants are added. They comprise mixtures of viscous petroleum oils, which have been absorbed into fillers like sawdust or ground cork, and diluted further with inorganic fillers like sand, waste slag and pulverized feldspar. The latter, like all ground quartz, retains sharp cutting edges upon each particle—a condition desired by many producers of such materials, who claim that sweeping is improved.

The elimination of dust during sweeping retards contagion by preventing the germ laden particles from being disseminated into the air. One example is:

Ground porous slag	60 parts
Paraffin oil (80-s)	10
Varnoline	7
Sawdust	23

The sawdust, varnoline and paraffin oil are mixed in a device, which has blades rubbing the sides of the container and when there is no longer evidence of dry unoiled sawdust particles, the slag is added slowly in small portions allowing each addition to be distributed before adding more. When the operation is complete essential oils are added to impart the desired odor, coloring matter to impart the shade and one pound of phenol dissolved in alcohol to impart disinfectant properties.

Uses of Germicidal Soap

Germicidal soaps are more commonly used for pets like dogs, cats, etc., but they are popular in the laundry and in special cases of sickness and epidemic. One experimenter proved that three per cent. naphtha in soap is sufficient as a general disinfecting soap and that six per cent. killed typhoid bacillus. The pine tar soaps, which are mixed oil soaps containing seven to ten per cent. of pine tar are fading out and being displaced by cresol, which is added in amounts from five to ten per cent. to soaps made from tallow and castor oil.

In the use of cresol for this purpose the question arises about which isomer is the best and, from data available the meta variety surpasses ortho and para, which are about equal in germicidal action. Formaldehyde was used for many years in soaps up to about twelve per cent. but its effect in hardening animal tissues renders it inferior to cresol.

Insect powders are usually sodium fluoride or the mixed salt, sodium potassium fluoride, although calcium arsenate may still be packaged and sold in some communities. For roaches and ants a mixture of sodium fluosilicate and hydrated lime in varying proportions has been popular for a number of years. For crickets kerosene oil acts as a repellant and copper sulfate is poison to them, which they apparently consume.

New Specialties

Rat and mice exterminants consist of mixtures of thallium sulfate, sodium fluoride and strychnine as baits and pure calcium cyanide for killing. Upholstery exterminators consist of formaldehyde dissolved in an organic solvent, which acts as a carrier and after penetrating into the fabric evaporates, leaving the less volatile component to disinfect. The same will suffice for carpets after thorough cleaning.

Deodorizers, which are usually essential oils are added to nearly all disinfectants and, strange to relate, these oils have disinfecting properties as evidenced by their coefficients listed below.

Clove oil	5-7
Eucalyptus oil	1-4
Lavender oil	1-5

These were obtained upon emulsions in which the oil comprised one-third of the total; the remainder being water and a soap as an emulsifying agent.

Ozone was long considered to have disinfecting and deodorizing properties and electrical instruments for its generation are still being sold. However, well substantiated experiments have proven that odors are destroyed but that disinfecting is not possible in concentrations of the gas in the atmosphere over three per cent., which is harmful to man.

Urinal blocks, which resemble cakes of ice in men's rooms of public buildings are constantly being changed and some of the more modern ones would have to be analyzed to learn their exact composition. However two formulae are listed below.

Paraformaldehyde	40 parts
Alcohol	19
Eucalyptus oil	1
Sodium Phosphate	40

After mixing, this will be a suspension and after allowing the alcohol to evaporate until a pasty consistency is obtained it is pressed into blocks.

Gypsum (paste)	90 parts
Paraformaldehyde	4
Bleaching powder	4
Eucalyptus oil	1
Salt	1

The gypsum or plaster paris is added slowly to water with stirring until a moldable paste is obtained and ninety pounds of this are mixed with the remaining components and pressed into blocks. The evolution of chlorine and formaldehyde vapors maintain an atmosphere of a disinfecting nature and the gypsum is washed into the drain by the mechanical action of a constantly flowing stream of water.

Some of these blocks consist largely of aromatic amines of unknown composition disseminated through inert fillers like those above. Pine oil emulsions now sold in concentrated form as transparent jellies for dilution in water just before use show promise of becoming popular with the public, who are fond of the pine odor, which is not lasting.

Sodium Hydroxide	300
Water	962
Rosin	2368
Pine oil	5920
Oleic acid	300
Tri-ethanol-amine	150

The rosin dissolved in the pine oil with the aid of heat and the oleic acid is stirred in after cooling. The sodium hydroxide and tri-ethanol-amine are stirred into the water and the rosin oil solution is added with vigorous agitation. This is diluted about one to thirty in water and used in washing floors.

The coal tar disinfectants used for wash bowls, sewers, etc. are water emulsions of industrial products from petroleum or coal tar and consisting of the three cresols in varying proportions with cresylic acids. They are sold to packagers with instructions that when mixed with a definite amount of water and stirred the resulting product will possess a certain coefficient upon The Rideal Walker scale. The emulsifying agent is already in the product before adding the water. They are similar to Lysol but of lower killing power and in a more unrefined state. The emulsifiers are either rosin or castor oil soaps with the addition of glue to prevent the action of extremely hard water at the point of use.

The xylenols, however, are now being produced in quantities and degree of purity to meet this need and have much higher coefficients than the cresols even in an emulsified state. One emulsion containing twenty per cent. xylenol and seventy-five per cent. water; the emulsifying agent comprising five per cent., had a coefficient of ten.

New Gunk Compound Wood floors may be de-oiled prior to painting by the use of a colloidal extraction solvent developed by Curran Corp., Malden, Mass. It is claimed to remove all traces of mineral oil and dirt from factory and mill floors, and to have unusual wetting and penetrating power. The solvent, Compound M-96 (phenolic type) "Gunk," is claimed to rinse completely in cold water and to involve no fire hazard, as would be presented by gasoline.

Toilet Soap A toilet soap containing, in addition to ordinary potassium oleate or stearate, a quantity of lithium carbonate, and magnesium carbonate, or thorium oxide, is described in E. P. 498,850 (1937), mentioned in *Chemical Trade Journal*, Apr. 28, '39, p. 413.

Tree-Wound Compound Discovery of a new use for wood flour in plugging worm holes, small knotholes, etc., in lumber by a secret chemical process has pepped up operation of Ray Gamble's Pacific Wood Flour Plant, Tacoma, Wash., to a twenty-four hour a day operation. The process turns the wood flour into a substance similar to the original tree and salvages a great deal of lumber which has been thrown away as useless.

Solvent Grease A hydro degreasing and safety solvent, called Gunk Concentrate P-92—"Aviation Grade," for use in degreasing and deoiling metal airplane fuselage and engine nacelles of aluminum skin construction, is announced by Curran Chemical Corp., Malden, Mass.

"Ebonblack" Touch-up Enamel A black enamel for the automobile refinishing trade, designed expressly for touch-up and repair work when speed is essential, is announced by du Pont. "Ebonblack" pyroxylin enamel hardens more rapidly than blacks previously available and dries quicker. May be rubbed and polished soon after application without assuming a gray tone. Rubbing compounds do not affect color.

Marking Ink For Glass A permanent laboratory ink for glass and porcelain which requires only an ordinary pen for application is offered by Clay-Adams Co., 44 E. 23 St., N. Y. City. Ink dries very quickly and can be removed only with an abrasive. It is non-acid, non-alkali, noninflammable, non-injurious, and is available in four colors: white, blue, red, and black.

Concrete Floor Paint Luminall Cement Floor Paint for concrete floors, made by National Chemical & Mfg. Co., Chicago, Ill., has a binder of synthetic (alkyd) resin and casein with a high strength metallic oxide pigment, and has the tenacious bonding power that is characteristic of alkyd resin. Other characteristics include easy application and high coverage per gallon. Film retains its elasticity which gives it longer life. It does not chip, flake, alligator, or powder off.

SANTOCURE
366,751

NARVA
399,962

Wyandotte
C.A.S.
402,121

ANACONDA
402,705

GASFLUX
403,391

National
Carbide
404,226

MIMOSA
KENMOSA
EXTRACT
406,617

ALPHA
405,497

Craftway
406,744

DIXIE
BOND
409,029

GASOLINE
409,113

TRIMFOOT

A TRIMFOOT SHOE COSMETIC
409,797

ORGANITE
410,337

Phrix
411,971

411,972

MARITIME
412,002

WITCO
413,260

412,141

INDIA
412,413

SILOEWOK-SAWANGAN
412,657

ALLOPRENE
413,056

ACIDAFFIN
413,058

NORMA
413,090

RADIX
412,152

CAVALPRENE
413,610

CARENGE
413,802

TRU-TEST
414,132

KROTIOX
414,243-4
RUTIOX

GREEN BAND
RED BAND
BLUE BAND
414,258-60

FILMSEAL
414,263

OZURIET
414,305

American
Brakeblok
412,402

Trade Mark Descriptions†

366,751. Monsanto Chemical Co., St. Louis, Mo.; Feb. 1, 1938; for compound used as vulcanization accelerator in curing of rubber articles; use since Jan. 18, 1938. Not subject to opposition.

399,962. Gottesman and Co., Inc., N. Y. City; Nov. 20, 1937; for wood pulp; use since Oct. 21, 1935.

402,121. J. B. Ford Co., Wyandotte, Mich.; Jan. 20, 1938; for modified soda ash used to standardize the acidity in cream used for manufacturing purposes; use since Mar. 1, 1926.

402,705. Anaconda Copper Mining Co., Anaconda, Mont., and N. Y. City; Feb. 5, 1938; for treble superphosphate and phosphate used either separately as a complete fertilizer or in combination with other materials in the manufacture of fertilizers; use since July 14, 1921.

403,391. Automatic Gasflux Co., Cleveland, O.; Feb. 25, 1938; for chemical agent in liquid form for use in metal welding and brazing apparatus and processes; use since Aug. 1, 1937.

404,226. National Carbide Corp., N. Y. City; Mar. 18, 1938; for calcium carbide; use since Sept. 12, 1936.

406,617. East African Tanning Extract Company, Ltd.; Nairobi, Kenya, Africa; May 23, 1938; for bark and bark extracts used for tanning purposes; use since Nov. 15, 1937.

405,497. The Glidden Co., Cleveland, O.; Apr. 20, 1938; for isolated vegetable protein for manufacturing adhesives, plastics, paints, insecticides, sizings and coatings for paper, textiles, and similar fabrics, medicines and pharmaceutical preparations, and food products. Use since July 3, 1935.

406,744. American Brush Corp., Chicago, Ill.; May 26, 1938; for wheat paste, and cold water size for use on walls; use since Feb. 10, 1937.

409,029. Eastern Clay Products, Inc., Eifort, O.; July 29, 1938; for bonding clays for foundry and other sand mold work; use since May, 1938.

409,113. Staten Island Home Utilities, Inc., Port Richmond and Staten Island, N. Y.; July 30, 1938; for gasoline; use since Jan. 3, 1936.

409,797. Wizard Lightfoot Appliance Co. (Trimfoot), St. Louis, Mo.; Aug. 19, 1938; for shoe polishes, cleaners, and creams; use since July 6, 1938.

410,337. Organite Co., Detroit, Mich.; Sept. 7, 1938; for water and brine treating composition for prevention and removal of rust and scale, and water softening; use since Aug. 1, 1937.

411,971. Schlesische Zellwolle Aktiengesellschaft, Hirschberg/Riesengebirge, Germany; Oct. 22, 1938; for textile fibers; use since May, 1937.

411,972. Schlesische Zellwolle Aktiengesellschaft, Hirschberg/Riesengebirge, Germany; Oct. 22, 1938; for textile fibers; use since July, 1936.

412,002. Maritime Oil Co., Houston, Tex.; Oct. 24, 1938; for gasoline, diesel fuel oils, lubricating oils, kerosene, and lubricating greases; use since July 1, 1932.

413,260. Wishnick-Tumpeer, Inc., Chicago, Ill.; Nov. 4, 1938; for line of inorganic and organic chemicals, including pigments, and various raw materials for the paint industry and other industries; use since June, 1937.

412,141. Hercules Powder Co., Wilmington, Del.; Oct. 28, 1938; for soaps—namely, soluble wax soap, sulfonated castor oil soap, and soluble pine oils for use as detergents or cleansing materials; use since Nov. 17, 1936.

412,413. India Paint & Lacquer Co. (India Lacquer Co.), Los Angeles, Calif.; Oct. 28, 1938; for paints in dry, paste, and ready-mixed form; paint enamels, lacquers, thinners, and related products; use since Dec. 3, 1928.

412,657. N. V. Cultuur Maatschappy Silowok Sawangan, Samarang, West Java, Netherlands, East Indies; Nov. 12, 1938; for kapok, kapok seeds, and rubber; use since May, 1912.

413,056. Wilmington Chemical Corp., Wilmington, Del.; Nov. 22, 1938; for viscous liquid or semi-liquid chemical raw material of unsaturated hydrocarbon nature; use since Sept. 28, 1938.

413,058. Wilmington Chemical Corp., Wilmington, Del.; Nov. 22, 1938; for viscous liquid or semi-liquid chemical raw material of unsaturated hydrocarbon nature; use since Sept. 28, 1938.

413,090. Edw. H. Hufnagel (Norma Chemical Co.), Mount Vernon, N. Y.; Nov. 22, 1938; for boiler compounds, soot destroyers, and rust solvents; use since May, 1938.

412,152. Radix Sociedad de Responsibilidad, Limitada, Buenos Aires, Argentina; Oct. 28, 1938; for plant growing compounds to cause and subsequently regulate root development, and also to effect the knitting of grafts and remargination of plant surface tissues; use since Oct. 24, 1938.

413,610. du Pont, Wilmington, Del.; Dec. 8, 1938; for neoprene coated fabrics; use since Oct. 3, 1938.

413,802. Standard Oil Co. of California, Wilmington, Del.; and San Francisco, Calif.; Dec. 12, 1938; for lubricating oil; use since Oct. 31, 1938.

414,132. Tru Test Marketing & Merchandising Corp., Chicago, Ill.; Dec. 22, 1938; for lacquer, putty, touch-up enamel, auto wax, and auto polish having incidental cleaning properties; use since July, 1937.

414,243-4. Titan Co. A/S, Fredrikstad, Norway; Dec. 27, 1938; for oxides, hydroxides, and other salts of metals, particularly of titanium, barium sulfate (blanc fixe), and calcium sulfate for use in industry, photography, medicine, and pharmacy, and pigments used in the manufacture of rubber, floor coverings, paper, and cosmetics; use since Apr. 20, 1938.

414,258-60. Ecclestone Chemical Co., Detroit, Mich.; Dec. 28, 1938; for scouring agents for cleaning purposes; use since Jan. 1, 1938.

414,263. Hickok Oil Corp., Toledo, O.; Dec. 28, 1938; for solvent preparations for use in removing carbon from cylinders of reciprocating pumps and motors; use since Dec. 23, 1938.

414,305. N. V. Hollandsche Draad en Pabelfabriek, Amsterdam, Netherlands; Dec. 29, 1938; for thermal insulating sheet materials and corrosion resistant coverings in sheet form; use since 1932.

412,402. American Brake Shoe and Foundry Co. (American Brakeblok Division), N. Y. City and Detroit, Mich.; Nov. 5, 1938; for adhesive cement for securing friction elements of brakes and clutches to the supports thereof; use since July 13, 1938.

† Trade-marks reproduced and described cover those appearing in the *U. S. Patent Gazettes*, April 18 to May 9, inclusive. See also next page.

New Trade Marks of the Month

HEKU
414,544

STERELATOR
414,627

CASCADE
414,763

414,764

PABCO
414,888

SEALCo
414,926

O'Rodye
415,088

K9P
414,798

Salem
415,353

BUTACITE
415,473

MALLETANE
415,505

Le·Cliff
415,517

FLA-PRO
"IT'S FLAME PROOF"
415,573

PARAMOUNT
415,682

SUNAROME
415,710

415,796

415,877

Extra Good
HAMMAN
Gasoline
415,948

BLOOMLIFE
416,154

RXFILM
416,190

BONDITE
416,193

Flameflux
416,240

CATAVAR
416,367

SWAN PENN
416,393

SPONGECOUSTIC
416,423

PA'SO
416,621

APKOTE
416,638

LUMINOL
416,648

LUMALITH
416,649

POUL-A-NURE
416,669

STaCRETE
416,707

DRI-KNIT
416,815

SPIRABAND
416,831

SPIRABELT
416,835

SPONJOL
416,840

CETOSOL
416,877

416,976

(Trade Mark Descriptions Continued)

414,544. Vereinigte Deutsche Metallwerke Aktiengesellschaft, Frankfort-am-Main, Germany; Jan. 5, 1939; for bituminous cements, for metalclad insulating and waterproofing material for building purposes; use since 1929.

414,627. Everson Mfg. Co., Chicago, Ill.; Jan. 9, 1939; for chlorine and/or ammonia, metering, feeding, and absorbing apparatus, where water or sewage is to be treated with said chemicals; use since Sept. 10, 1938.

414,763. Linde Air Products Co., N. Y. City; Jan. 12, 1939; for oxygen; use since July 22, 1938.

414,764. Aluminum Co. of America, Pittsburgh, Pa.; Jan. 13, 1939; for house paint; use since Dec. 8, 1938.

414,888. The Paraffine Companies, Inc., San Francisco, Calif.; Jan. 16, 1939; for ready-mixed liquid, paste, and emulsified paints; paint enamels, lacquers, thinners, varnishes, and the like; use since July 1, 1904.

414,926. Sealco By-Products Co., Inc., Bluefield, W. Va.; Jan. 17, 1939; for silver polish, lens polish, and pulverized diatomaceous earth used as an abrasive and polishing compound; use since Dec. 19, 1938.

415,088. O'Rourke Bros. Co., Paterson, N. J.; Jan. 21, 1939; for paints for use on fabrics; use since Jan. 10, 1939.

414,798. The Morton S. Pine Co., Cleveland, O.; Jan. 13, 1939; for liquid detergent used in cleaning—namely, a cleaner for cat and dog accidents; Sept. 1, 1938.

415,353. Salem Chemical & Supply Co., Salem, Mass.; Jan. 28, 1939; for glass cleaner; use since 1893.

415,473. du Pont, Wilmington, Del.; Feb. 1, 1939; for polyvinyl acetal resins; use since Jan. 5, 1939.

415,505. Gas-It Corp., N. Y. City; Feb. 2, 1939; for gas for cutting and welding purposes; use since Oct. 1, 1938.

415,517. Le Cliff Distributing Co., Cedar Lake, Ind.; Feb. 2, 1939; for shoe creams, dressing, and polishes; use since Dec. 16, 1938.

415,573. American Flame Proofing Corp., Everett, Wash.; Feb. 4, 1939; for chemical compounds for the treatment of wood products for retarding combustion; use since Jan. 25, 1939.

415,682. W. H. Barber Co., Minneapolis, Minn.; Feb. 4, 1939; for gasoline, kerosene, fuel oil, lubricating oils, and greases; use since Aug. 1, 1937.

415,710. Felton Chemical Co., Inc., N. Y. City; Feb. 7, 1939; for natural and synthetic essential oils and aromatic chemicals for the manufacture of toilet preparations; use since Jan. 27, 1939.

415,796. Progress Paint Mfg. Co., Louisville, Ky.; Feb. 8, 1939; for ready-mixed paint, varnish, and enamel for inside and outside wooden floors, concrete floors, porches, and linoleum; use since Jan. 27, 1939.

415,877. Congoleum-Nairn, Inc., Kearny, N. J.; Feb. 10, 1939; for wax preparations for polishing floor surfaces of all kinds; use since June 30, 1932.

415,948. Hamman Exploration Co., Houston, Tex.; Feb. 11, 1939; for gasoline, fuel, and lubricating oil, and greases; use since Nov. 5, 1938.

416,154. August A. Meyer (Cut Flower Food Co.), Maywood, Ill.; Feb. 17, 1939; for composition containing chemical ingredients for strengthening, sterilizing, feeding and promoting the development of cut plants, as a water-soluble mixture; use since Feb. 1, 1939.

416,190. Ivers-Lee Co., Newark, N. J.; Feb. 18, 1939; for transparent sheet material consisting of a rubber composition for making packages; use since Mar. 16, 1938.

416,193. I. F. Laucks, Inc., Seattle, Wash.; Feb. 18, 1939; for glues; use since Feb. 3, 1939.

416,240. The Automatic Gasflux Co., Cleveland, O.; Feb. 20, 1939; for chemical agent in liquid form for use in metal brazing and welding apparatus and processes; use since Jan. 11, 1939.

416,367. Catalin Corp., N. Y. City; Feb. 24, 1939; for resins to be used in fabrication of varnish and the like; use since Apr. 13, 1937.

416,393. Swan-Finch Oil Corp., N. Y. City; Feb. 24, 1939; for lubricating oils and greases; use since Feb. 24, 1933.

416,423. Johns-Manville Corp., N. Y. City; Feb. 25, 1939; for acoustical sheet material; use since Dec. 9, 1938.

416,621. Lee R. Timmons (Charles Paint Research Co.), Kansas City, Mo.; Mar. 2, 1939; for paint, varnish and lacquer softener; use since Sept. 30, 1938.

416,638. Asphalt Process Corp., N. Y. City; Mar. 3, 1939; for emulsified asphalt; use since Feb. 7, 1939.

416,648. General Dyestuff Corp., N. Y. City; Mar. 3, 1939; for dyes and dyestuffs; use since Feb. 15, 1939.

416,649. General Printing Ink Corp., N. Y. City; Mar. 3, 1939; for printing ink; use since Feb. 4, 1939.

416,669. Woodson K. Woods (Chaumiere Farms), Steelville, Mo.; Mar. 3, 1939; for soil fertilizer material; use since Feb. 8, 1939.

416,707. Standard Lime and Stone Co., Baltimore, Md.; Mar. 4, 1939; for tap hole cement or mixture; use since Dec. 17, 1938.

416,815. Quaker Chemical Products Corp., Conshohocken, Pa.; Mar. 8, 1939; for oleaginous preparation used for softening, lubricating, and conditioning silk and rayon yarn for knitting; use since Jan. 16, 1939.

416,831. Behr-Manning Corp., Troy, N. Y.; Mar. 9, 1939; for coated abrasives; use since Feb. 15, 1939.

416,835. Behr-Manning Corp., Troy, N. Y.; Mar. 9, 1939; for coated abrasives; use since Feb. 15, 1939.

416,840. Clarence M. Cobb, Boston, Mass.; Mar. 9, 1939; for laundry detergents sold in liquid form and dry cleaning preparations for domestic or industrial use; use since Feb. 28, 1939.

416,877. Stein, Hall & Co., N. Y. City; Mar. 9, 1939; for sizing or finishing agents for textiles; use since Mar. 15, 1938.

416,976. United States Smelting, Refining and Mining Co., Portland, Maine, and Boston, Mass.; Mar. 11, 1939; for zinc in slabs or pigs; use since Feb. 24, 1939.

Opens Fair Exhibit

U. S. Stoneware, Akron, announces that it will have a comprehensive display of its products at the N. Y. "World's Fair," in the B. F. Goodrich building.

YOUR FINISHED PRODUCT
is no better than
THE CHEMICALS THAT GO INTO IT

Chemicals are seldom an end in themselves.

● Incorporated into the finished product the chemical may lose its identity. Yet the product can be no better than the raw materials which enter into it ● Manufacturers in every field of American Industry find in ISCO chemicals quality and dependability nowhere excelled ● ISCO chemicals are manufactured, imported or refined by ourselves—with facilities, equipment and personnel unrivaled ● Our plant at Niagara Falls, N. Y., produces heavy chemicals including:

CAUSTIC POTASH—Solid, Flake, Liquid, Granular, Broken
CAUSTIC SODA—Flake, Solid, Crystal, Liquid
CARBONATE OF POTASH—Calcined, Hydrated, Liquid
IRON CHLORIDE—Lumps, Crystals
CHLORIDE OF LIME (Bleaching Powder)—35/37% Free Flowing
HYDRATED LIME—Prime White
LARVACIDE—Fumigant without a peer

In our Jersey City plant we refine GUMS and WAXES and manufacture LEATHER SEASONS and FINISHES pronounced second to none at any price.

A feature of the GARDENS ON PARADE Exhibit at the New York World's Fair is a display of LARVACIDE in its new role of Soil Fumigant. This exhibit is highly interesting to Nurserymen, Seedsmen, Vegetable Growers, Florists, those who have the care of Golf Courses, Cemeteries, Private Estates, and others to whom soil treatment by LARVACIDE now opens up the prospect of lower costs and better yield through the destruction of harmful soil parasites.

See this exhibit in GARDENS ON PARADE — Booth 75.

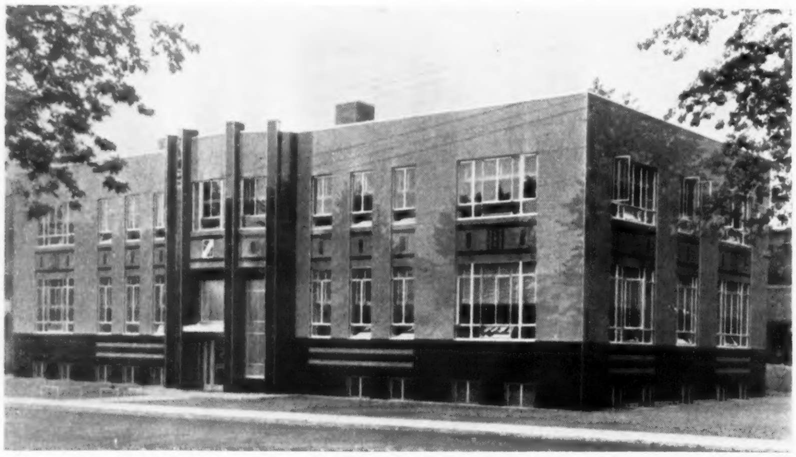
INNIS, SPEIDEN & CO.
Established 1816
117-119 Liberty Street · · · NEW YORK
BOSTON · PHILADELPHIA · CHICAGO · CLEVELAND · GLOVERSVILLE, N. Y.

A National Institution

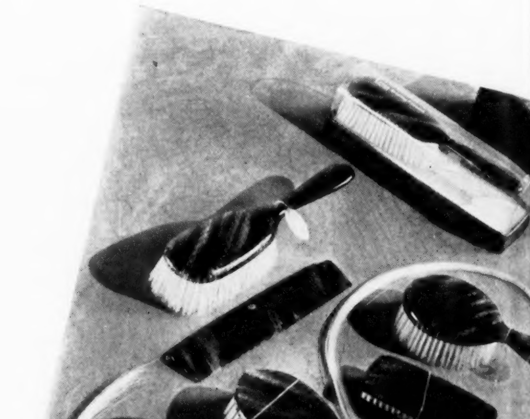
Mark Twain and the Weather: Capt. Clifford J. MacGregor, dauntless explorer, disagrees with Mark Twain and has spent eight years in the North Polar regions studying the weather and collecting much scientific and educational data of importance. He has just returned from an expedition of fifteen months in North Greenland and reports that industry's lightest structural metal, magnesium alloy (Dowmetal), was used to great advantage in a great number of cases. His sled was fashioned of hickory and Dowmetal, and magnesium was also used in construction of shovels, radio cabinets, battery carriers, etc.

Modern Architecture: This is Frank Lloyd Wright's conception of the modern office, which he designed for Johnson's Wax Co., Racine, as an architectural interpretation of "modern business at its best." The office building was formally opened April 22-24. This view is of the main work room. The building is supported by "golf tee" columns, said to give maximum strength and floor space; is heated through the floor and lighted through 43 miles of glass tubing and skylights.

Steel at the Fair: In the entrance of the U. S. Steel Subsidiaries' exhibit at the N. Y. World's Fair, a huge pictorial graph shows the growth of steel in use since the time of George Washington. From one-half pound per capita in 1789, the use of steel has grown to 19,000 pounds today. Thin sheets of steel are hammered into miniature buildings, bridges, tools, houses, tractors, streamliners, airplanes, and automobiles, and mounted on a background of plain blue steel to form a striking panorama of steel's service to modern civilization. Otto Wester, pioneer of this art medium in America, who got his start with the W.P.A., executed the mural.



Libbey-Owens-Ford Glass announced on May 5, that it is ready to go ahead with the production of glastone, the new, load-bearing masonry unit. Glastone is made by bonding vitrolite to lightweight concrete with a waterproof mastic and rust-proof steel. Above, the L-O-F office building at Charleston, W. Va., whose walls are glastone in three colors.



"Exton" bristle made of nylon is introduced by Du Pont in the "Patrician" line in extra heavy tortoise shell "Pyralin" plastic, shown above. Ladies' combs and brushes come in several sizes. Note the sealed plastic gift container and the identifying medallion.

U. S. Stoneware's exhibit at the N. Y. World's Fair (Goodrich Building) stresses "Flexlock" pipe joints and "U. S. Stoneware" piping.

THE AIR CASTLES OF RESEARCH

are

TOMORROW'S REALITIES

Included in the list of almost 100 Sharples Synthetic Organic Chemicals may be the compound you need to bring your "air castle" to earth. It may prove to be the starting point or addition reagent required to convert that "unworkable" process into a profitable reality. Why not discuss your problem with us?

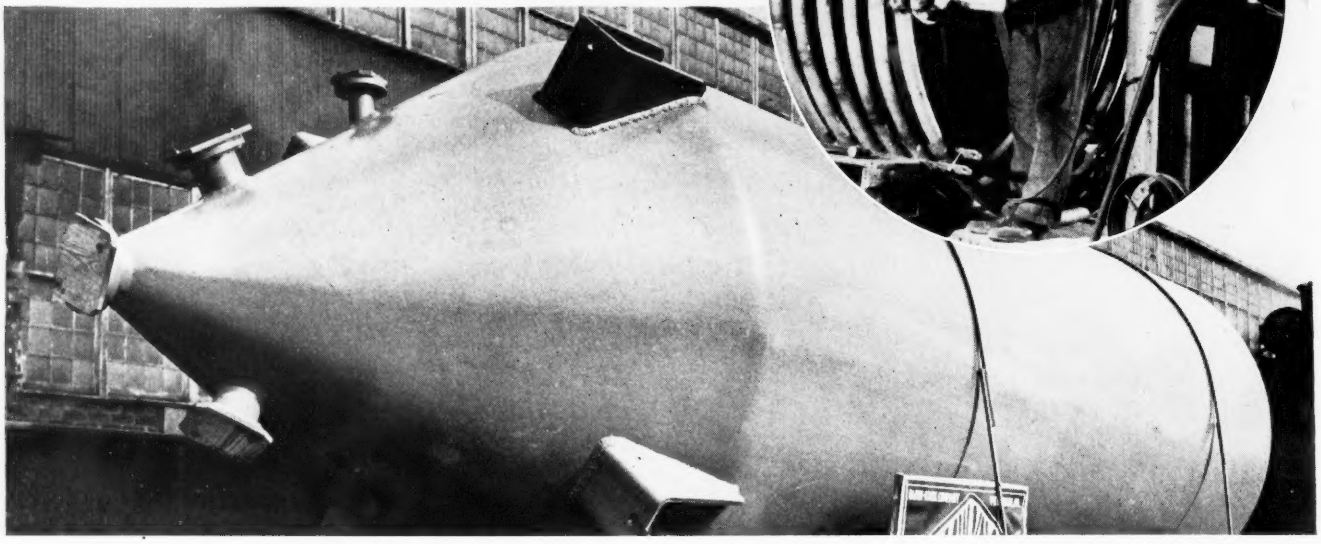
The
SHARPLES SOLVENTS
CORPORATION
PHILADELPHIA · CHICAGO · NEW YORK

SHARPLES TRADE MARK SOLVENTS

*Pentasol (Pure Amyl Alcohol)
*Pent-Acetate (100% Amyl)
Normal Butyl Carbinol
Isobutyl Carbinol
Sec-Butyl Carbinol
Diethyl Carbinol
Dimethyl Ethyl Carbinol
Tertiary Amyl Alcohol
*Pentaphen
(p-Tertiary Amyl Phenol)
Diamyl Phenol
Ortho Amyl Phenol
Monoamylamine
Diamylamine
Triamylamine
n-Monobutylamine
n-Dibutylamine
n-Tributylamine
Monoamyl Naphthalene
Diamyl Naphthalene
Polyamyl Naphthalenes
Mixed Amyl Naphthalenes
Normal Amyl Chloride
Normal Butyl Chloride
Mixed Amyl Chlorides
Dichloropentanes
Amyl Mercaptan
Diamyl Sulphide
*Pentalarm
Amylenes
Diamylene
Amyl Benzenes
Diamyl Ether
SEMI-COMMERCIAL PRODUCTS
LABORATORY PRODUCTS
*Trade Mark Registered

New in the Chemical Equipment Field

Right, this 82-inch diameter coil was fabricated of more than half a ton of Hastelloy C, a nickel-molybdenum-chromium-iron alloy which has exceptional oxidation resistance. It will withstand the action of wet chlorine; sulfuric, phosphoric, and organic acids; and acid salt solutions. Coil, consisting of 7½ turns, was fabricated by welding together lengths of 2-inch extra heavy cast pipe. Spacer straps, bolts and nuts, as well as the coil pipe itself are all cast of the same alloy. The four-strap extensions are for a unique lifting device, parts of which are also of the same corrosion-resistant metal. In all, 1,125 lbs. of alloy were used.



Above, photograph of a "Ductilwelded" digester recently fabricated by Blaw-Knox for one of the Eastern paper mills. Illustrating the caliber of welding employed in the manufacture of pressure vessels, the welded seams are smooth and almost imperceptible. The digester is 8 feet 6 inches in diameter and 32 feet in overall length; 1 1/16 inch plate was used and the unit was designed for a working pressure of 125 lbs. The vessel was completely stress relieved and all welds X-rayed.

A model of a "Sink-and-Float" separation plant is part of Du Pont's "Wonder World of Chemistry" exhibit at the World's Fair. A complete description appeared in the March issue, page 289.

News Review of the Month

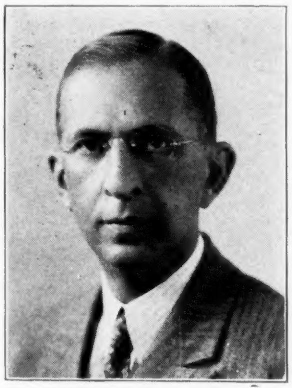
M.C.A. AT SKYTOP; A.I.Ch.E. AT AKRON

Manufacturing Chemists Elect Lammot Du Pont President—Hear G. M.'s Kettering Discuss Research—Engineers at Akron, Ohio, Celebrate the Goodyear Centenary—

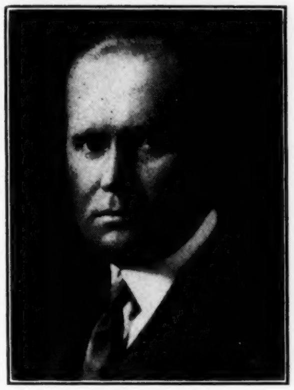
By Walter J. Murphy

Managing Editor, Chemical Industries

WITH an all-time attendance record for annual meetings members and guests of the Manufacturing Chemists, gathered for the 67th at Skytop Club, Skytop, Pa., June 1-2, heard William B. Bell, Cyanamid's president, vigorously assail the general belief held by the public at large that industrialists want war, listened to Charles F. Kettering of General Motors, discuss the future of "radiation chemistry," and elected Lammot DuPont, president of E. I. DuPont de Nemours & Co., president of the group, succeeding E. M. Allen, president of Mathieson Alkali, who has headed the M.C.A. for the past two years.



LAMMOT DU PONT



E. M. ALLEN

Mathieson head, E. M. Allen, hands over M.C.A. gavel to Lammot DuPont.

Mr. Bell, who had just recently returned from an extensive European trip, reported in detail on the international situation abroad. Analyzing Germany's position on raw materials, particularly petroleum resources, the speaker while admitting that no one could with certainty say what might take place in the near future, did express the opinion that the chances of another war seemed more remote. Turning from the foreign field, Mr. Bell reviewed several bills now pending in Washington that would have serious effects on business if passed, including the so-called May Bill, the Bone Bill, and the Lea Bill.

Highlights of the work of the executive committee of the M.C.A. during the past year and also the labors of various subcommittees were reviewed by the executive committee chairman, Harry L. Derby, president, American Cyanamid & Chemical. The speaker briefly touched upon such subjects as the new Federal Food & Drug Act, labeling, trade agreements, state legislation, and safety. Mr. Derby reported that the M.C.A. model state insecticide and fungicide bill has passed in Maryland and is before the legislative bodies of several other states.

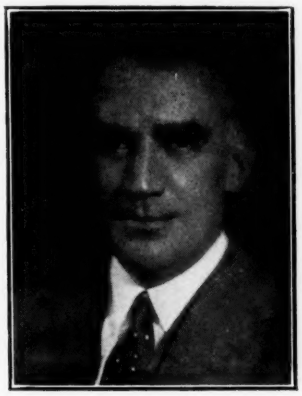
Technical committees of the association have been occupied with drastic revisions in the rules for transportation of dangerous products by rail and water. This work entails considerable co-operative effort with the I.C.C. and the Commerce Department and, once effected, these regulations are expected to prevail for years.

The association has initiated a plan for reporting accidents during transportation, in plants to customers, and at places of consignment. Warning labels on poisonous household products are also being given attention. In order to determine where the "chemical dollar" goes, the M.C.A. has made arrangements with the National Conference Board for compilation of data showing such distribution.

Mr. Kettering, internationally known scientist and inventor, introduced by Mr. Allen "as the man who put the woman at the wheel of the automobile through the auto self-starter," told of some of the experiences of his company with long range research project planning and, somewhat in detail, explained the work being done to discover just what nature does in building up plant life. While they have but just begun to "scratch the surface," the work already accomplished has been sufficient to indicate a great future for radiation chemistry.

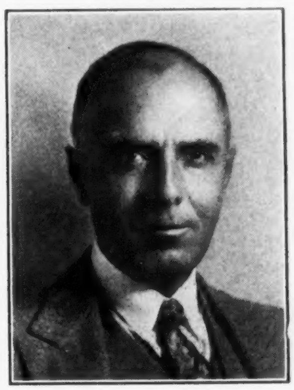
Members of the S.O.C.M.A. were hosts to the M.C.A. at the dinner held Thursday evening, June 1. August Merz, vice-president of Calco, and president of the S.O.C.M.A., acted as toastmaster and introduced the guest speaker, Dr. Robert C. Clothier, president of Rutgers University. An outstanding

GEORGE W. MERCK



CHARLES BELKNAP

J. W. MC LAUGHLIN



HARRY L. DERBY

M.C.A. officers reelected at Skytop included George W. Merck and Charles Belknap, both vice-presidents; J. W. McLaughlin, treasurer, and Harry L. Derby, chairman, Executive Committee. Only change on the committee was the election of O. C. Ingraham, succeeding C. W. Millard.

Meetings of the Month

figure in the educational world, Dr. Clothier made a vigorous plea for a broader viewpoint in our colleges and universities so that the graduates of the future would have not only a satisfactory technical groundwork but would have the breadth of vision to be able intelligently to evaluate the problems of our social, industrial and economic life and to actively participate in the formulation of the measures designed to improve the welfare of all mankind. He urged the industrialists present to take the time to make a serious study of the problems confronting the institutions of higher learning.

The only change made in the executive committee of the M.C.A. was the election of Harold O. C. Ingraham, president of General Chemical, in place of Charles W. Millard of the same company, who has retired from active connection with the chemical industry.

Chemical Engineers Celebrate Two Centenaries—Goodyear and Lunge—Hold Symposium on Five Anti-corrosion Aids

WITH the entire world celebrating the centenary of Goodyear's almost accidental discovery of a process for the vulcanization of rubber, it was most fitting that the American Institute of Chemical Engineers should choose Akron for the semi-annual meeting, held May 15-17, at the Mayflower in that city. While Goodyear's momentous discovery was made at Woburn, Mass., the city of Akron, since the invention of the pneumatic tire has been internationally known as the "Rubber City."

Following the welcoming address of Bruce W. Bierce, president of the Akron Chamber of Commerce, the 400-odd members in attendance, and with Dr. Webster N. Jones of du Pont presiding, heard Henry J. Baker, Jr., commissioner of conciliation of the U. S. Department of Labor, claim that "The lack of a realistic attitude on the part of management is the cause of much labor unrest."

Mr. Baker, in the opening address of the convention, reviewed labor conditions in the chemical industry. The speaker pointed out that, because its personnel is under the supervision and direction of trained engineers, the chemical industry has been relatively free of labor trouble.

"Engineers deal with facts and have a sound reason for their actions, whether the problem is one of personnel or construction of a plant," he said. "For this reason the average workman has confidence in the engineer's ability and respects his judgment."

Sharp criticism of Mr. Baker's paper was made from the floor by several members who complained that the speaker had only cited instances where management was at fault, and not labor. Replying, Mr. Baker pointed out that he had not intentionally attempted to "whitewash" labor, but felt that in addressing management or representatives of management that it was advisable to point out situations where, fundamentally, management was in error. The speaker also reported that very often companies with enlightened and very liberal viewpoints discovered that such policies were thwarted by plant managers, and even foremen, intentionally or unintentionally misinterpreting such programs, and urged management to be on guard against such situations.

What in reality was a symposium on coatings was provided by 5 speakers. E. R. Bridgwater, du Pont, discussed "Neoprene As A Construction Material For The Chemical Industry"; Frank K. Schoenfeld, B. F. Goodrich Co., reported on "Koroseal As An Engineering Material"; N. E. Kimball read a paper prepared by F. H. Manchester on "Plioweld In The Chemical Industry"; C. A. Rauh, Maurice A. Knight Co., reviewed "Pyroflex Constructions For Acid and Alkali Service"; while "Enameled Chemical Equipment" was described by Dr. Andrew I. Andrews, Dept. of Ceramic Engineering, University of Illinois. A general outline of the physical and chemical properties of carbon and graphite as used in chemical engineering was supplied by L. C. Werking of National Carbon, Cleveland, as well as a detailed explanation of Karbate (impervious carbon and graphite).

Perfection of a method for producing an improved fuel from lignite, or brown coal, was announced by Prof. E. P. Schoch, Director of the Bureau of Industrial Chemistry of the University of Texas. By subjecting a mixture of the lignite and a light petroleum oil to heat in a closed vessel, large amounts of water contained in the original mined product are removed. The resulting product is comparable to soft coal in heating value.

Professor Schoch reported on the final stage of the developments which consisted of overcoming technical difficulties as well as the danger of fire at high temperatures with large amounts of light petroleum oil, which is chiefly naphtha.

The new process has not been operated on a commercial scale. The speaker estimated, however, that a plant can be constructed to produce 231 tons of lignite fuel a day at a cost of $3.15 a ton. The product will have a heating value of 11,000 Btu. to the lb. and will compare with coal at $4.05 a ton and a heating value of 14,000 Btu. to the lb.

The speaker at the banquet on Tuesday evening was the consultant Dr. William C. Geer who in his inimitable way reviewed by word and by actual experiment the trials and tribulations of Goodyear and his final triumph. So realistic was Dr. Geer's speech that it is difficult to believe that even one of his listeners left the dinner without a clear understanding of the chaotic life of Charles Goodyear and the debt owed by humanity for the contribution that that dreamer made to civilization's advancement.

Candid camera "shots" at Akron: Left to right, Frank K. Schoenfeld, B. F. Goodrich Co.; Ernest R. Bridgwater, Du Pont; Stephen Tyler, A. I. Ch. E. secretary; C. S. Quillen, Mixing Equipment; no visit to Akron would be complete without a trip out to Barberton to enjoy Columbia Alkali hospitality; extreme right, Dr. Irving Muscat, director of research of Columbia Alkali, in his spacious quarters in the newly constructed laboratory.

Stauffer Chemicals

Stauffer
CHEMICALS

A DEPENDABLE SOURCE OF SUPPLY

CARBON BISULPHIDE

Stauffer Carbon Bisulphide is a clear, water-white product testing 99.99 pure. Prompt deliveries can be made in any quantity from five-gallon drums to fifty-ton tank cars, from four strategically located plants.

OTHER STAUFFER PRODUCTS

BORIC ACID : CARBON TETRACHLORIDE : BORAX : TITANIUM TETRACHLORIDE : SULPHUR CHLORIDE : SILICON TETRACHLORIDE : CREAM OF TARTAR : SULPHURIC ACID : CAUSTIC SODA : TARTARIC ACID WHITING : SULPHUR : LIQUID CHLORINE : NITRATE OF POTASH

STAUFFER CHEMICAL COMPANY, 420 LEXINGTON AVENUE, NEW YORK, N. Y.

624 California St., San Francisco, Cal. • Freeport, Texas • Rives-Strong Bldg., Los Angeles, Cal. • Carbide and Carbon Bldg., Chicago, Ill.
424 Ohio Bldg., Akron, Ohio • Apopka, Florida

By a very narrow margin Dr. George Granger Brown, professor of chemical engineering at the University of Michigan almost did not receive formal presentation of the 1939 William H. Walker Medal of the A.I.Ch.E., but quick thinking on the part of the toastmaster saved the day.

The medal is awarded annually for an outstanding contribution to chemical engineering literature published in the Institute's Transactions by a member during a 3-year period prior to the award. In presenting the medal, Dr. Webster N. Jones, president of the Institute, cited 3 of Dr. Brown's papers on the subjects of thermodynamics and distillation as being of exceptional merit.

Dr. Brown was graduated from N. Y. U. in 1917 and received his doctor's degree from the University of Michigan in 1924. He has been on the chemical engineering teaching staff at Michigan since 1920. Internationally known for his researches on motor fuel and the properties of natural gasoline and petroleum, Dr. Brown has served as consultant for such organizations as The Texas Co., Sinclair Refining Co., Dixie Refining Co., Universal Oil Products Co., Socony-Vacuum Oil Co., Sun Oil Co., and Phillips Petroleum Co. Since 1920 he has acted as consulting engineer for the Michigan Geological Survey.

Lunge Centenary

The Goodyear centenary was not the ony one celebrated at the meeting. The one-hundredth anniversary of the birth of the late Prof. George Lunge of Zurich was appropriately remembered in a paper delivered by his friend and collaborator, Dr. Ernst Berl of Carnegie Institute of Technology.

George Lunge, born September, 1839, died January, 1923, was one of the outstanding chemical engineers to whom all chemical engineers today owe a lot of deepest gratitude. He was partly responsible for the introduction of the Glover tower in the sulfuric acid industry. He invented the first reaction tower, known as the Lunge-Rohrmann plate reaction tower, and carried out a very useful process of his own for making 100% sulfuric acid from 94-97% sulfuric acid.

As usual, plant inspections occupied much of the time of the engineers attending the meeting. Trips scheduled included 3 of the largest rubber plants at Akron, an inspection of the chemical stoneware manufacturing plant of Maurice A. Knight, and an intimate inspection of the Babcock & Wilcox plant at nearby Barberton. Probably the newest development that was seen was the manufacture of "Air-Foam" articles at Goodyear. Air foam is made from latex which has been beaten into a froth by beating air into it and already mattresses, automobile cushions, etc., are in commercial production.

Heavy Chemicals

Copper Salts Reduced as Metal Weakens

May Tonnages of Industrial Chemicals Below April—More Optimistic Tone Noted In Final Week of the Month—Alkali Volume Off—Tin Derivatives Firm—Antimony Metal Up—

A NOTICEABLE decline in shipments of industrial chemicals was reported in the first 3 weeks of the past month. Likewise, spot inquiries fell off from the pace maintained in the earlier months of the year. In the last week of the month a turn for the better set in and a moderate amount of improvement in the movement of tonnage was in evidence. The somewhat easier tone in the foreign situation, the settlement of the coal strike, and the possibility that this session of Congress may yet provide some measure of relief on taxation, the Wagner Act, and the Wages and Hours Act, were the leading factors in the restoration of a bullish feeling. Momentarily at least, there is hope that the last half of '39 will see a renewal of the forward movement and there is a good chance that the usual "summer dullness" will not be as pronounced as was expected a few weeks ago.

Copper Salts Decline

Price fluctuations were unusually few last month. With copper down to 10c further decline was inevitable in copper sulfate. Black oxide of copper was reduced 1¾c to 15c; the red oxide was off 1c to a basis of 15¾c; the carbonate was scheduled at 14c, a drop of ½c; while the nitrate was reduced 1c to 14.80c. The firm position of antimony metal in China was reflected in this country by another advance, this one of ½c, and the market at the end of the month was quoted at 12c.

Adverse weather conditions affected somewhat the movement of calcium chloride for dust laying purposes. Withdrawals of chlorine for water and sanitation purposes were heavy. A firm tone was in evidence in copperas. Good demand for plating chemicals was maintained throughout the period under review, but producers anticipate some decline in the near future due to seasonal influences. The pronounced weakness in the acetic acid market shows no signs of reversal. Shipments of alkalies were down rather sharply from the March-April level. The rayon companies continue to take sizable quantities of caustic and the outlook in this direction for the next few months has improved slightly. "Soapers" are only taking routine shipments of alkali. With tin still exhibiting very firm price tendencies the important tin salts are holding at very firm levels. Bichromates are moving in fairly satisfactory volume, with the dry color producers taking the major share of the tonnage. The current demand for sulfuric reflects the rather low state of operations in important consuming industries.

Important Price Changes

	May 31	Apr. 30
ADVANCED		
Antimony	$0.12	$0.11½
Tin oxide	.52	.50
DECLINED		
Copper carbonate, 52-54%	$0.14	$0.14½
nitrate	.148	.1660
oxide, black	.15	.16¾
red	.15¾	.16¾
sulfate	4.10	4.25

A seasonal upturn was apparent in the demand for refrigerants. A slightly more active market was reported for sodium chlorate for weed-killing purposes. Withdrawals of the important detergents were reported as being satisfactory.

Little in the way of price changes are looked for in the trade at the close of the first half of '39. While conditions abroad and in this country are still very uncertain, the general feeling at the moment is that the summer period will be a fairly active one in most chemical consuming industries and that the last half of the year will be likely to be on a par with the activity of the first quarter. However, it is more than likely that a great deal of conservatism will be in evidence for several months to come. Industrialists are particularly anxious to see what develops in the foreign situation at the close of the harvest period.

Patents To Be Pooled

Patents covering processes for the recovery of sulfur from gases developed in metallurgical operations, jointly owned by British and Swedish groups and those which are owned by German and Swiss interests are to be pooled, according to a report to the Chemical Division, Dept. of Commerce, from the office of the American Commercial Attache at London. These groups have commercialized their processes and have placed their patents and processes in the hands of a newly formed company, Sulphur Patents Limited, to handle licensing operations. The output of sulfur by the British, Swedish, German, and Swiss companies will be marketed by Lurgi Chemie, Frankfort, it is reported.

Michigan Alkali's South Works, Wyandotte, Mich., set up a company record during 1938 of 273 consecutive days without a lost-time accident. This is a total of over 1,600,000 man-hours safely worked, beginning March 20 and ending Dec. 19.

Fine Chemicals

Mercurials Hold Firm as Quicksilver Declines

Agar Has Spectacular Rise—Seasonal Increase In Demand For Citric Acid and Tartars—Consumption of Alcohol Rises Slightly—Cadmium Salts Steady—Aromatics Hold Firm—

THE markets for fine chemicals, pharmaceuticals, and aromatic chemicals were featured by a rise in No. 1 agar and by a sharp slump in the quicksilver market. Agar had two advances in the last 30 days, the first one of 10c and the second an increase of 15c, making the new price level $1.25. The rise is generally attributed to the exercise of closer control in Japan over prices and exports.

Mercury prices have tumbled severely with several separate declines reported. So far this has failed to have any effect on the price structure of the hard and soft mercurials and the prices reached in April were still in effect at the close of May. Producers of domestic quicksilver have so far met the stiff competition offered by imported material. The present market is a buyer's market. Word comes from abroad that an Italian-Spanish mercury marketing organization has been set up to control the world markets in this item. This move was generally expected by the trade here following the victory of Franco. It is generally supposed that the new cartel will follow out the general lines of the one that was in existence prior to the Spanish Civil War.

Mercury output was up 9% last year, according to U. S. Bureau of Mines. In spite of unsettled conditions, Spain is reported to have produced for export about 40,000 flasks, topping the 28,357 flasks in '37 by a very substantial margin. Italian exports amounted to 55,327 flasks, as compared with 67,075 in '37. U. S. production last year was 17,991 flasks, about 9% over '37, when 16,508 were produced. U. S. imports of mercury fell drastically to 2,362 flasks in '38. In '37 were imported 18,917 flasks. In 1938, Spain supplied about half the imports, 1,251, with Italy furnishing the balance.

Better Demand For Citric

A better call was in evidence for such items as citric and tartaric acids due, of course, to seasonal influences. The price undertone on citric and all of the tartars was strong and the former seemed to be well stabilized at the lower prices announced in April. No change was reported in the markets for bismuth and bismuth salts. A steady demand was also in evidence for cadmium and cadmium salts, with the electroplating industry taking sizable quantities. A rather narrow market prevailed for menthol and the price situation remained unaltered. Very little call for camphor was reported by the leading importers. Seasonal consumption of sodium benzoate was said to be rising satisfactorily.

Important Price Changes

	May 31	Apr. 30
ADVANCED		
Agar, No. 1	$1.25	$1.00
DECLINED		
Mercury	$85.00	$95.00

Consumption of specially denatured alcohol for industrial purposes has held up rather well, while pricewise, a slightly firmer tone was noted. A steady price situation was reported in C.P. glycerine with consumers taking normal quantities for this period of the year. Codliver oil's undertone is easy and prices are favorable to the buyers.

The demand for lycopodium has declined rather sharply, but the price structure is holding at firm levels, due to the lack of heavy stocks in this country. Suppliers of quinine and its salts reported a decided seasonal improvement in these items.

Steady Tone In Aromatics

A moderate amount of business in aromatic chemicals provided sufficient background to maintain a generally firm price structure. Manufacturers of disinfectants and household insecticides were heavy buyers of essential oils. Some weaknesses were in evidence in some of the more important members of the essential oil family and buyers were said to have taken keen advantage of this to purchase ahead.

Offers Valuable Chart

A new chart tabulating the reactions of qualitative analysis has just been published by Merck & Co., Inc., manufacturing chemists, Rahway, N. J. Chart was designed by Stephen G. Simpson, assistant professor of analytical chemistry at M. I.T. The procedure in constructing this chart was discussed by Dr. Simpson in the *Journal of Chemical Education,* Volume 15, pages 131-132, March 1938, under the title "Method of Tabulating the Reactions of Qualitative Analysis."

Through the courtesy of Dr. Simpson, Merck is making this chart available for limited distribution to qualified students without charge and on request.

Drug Exchange to Golf

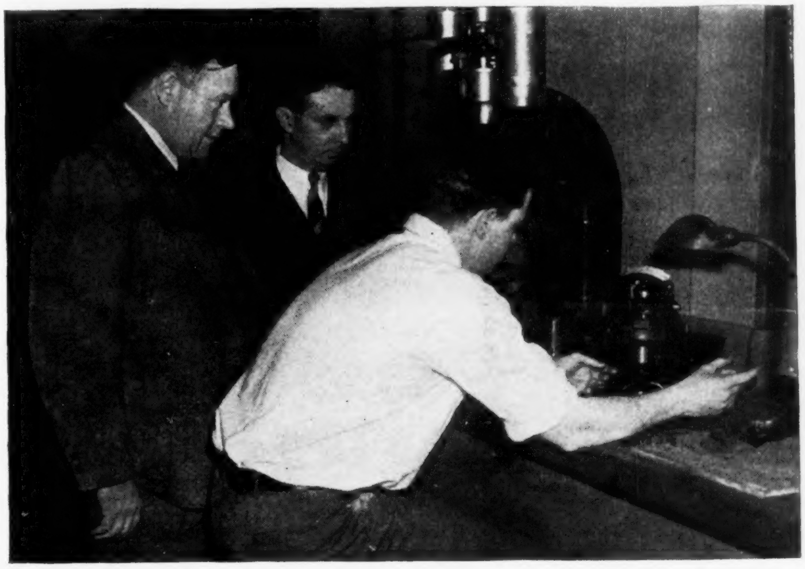
The Philadelphia Drug Exchange will hold its annual Spring Outing at the LuLu Country Club, Oreland, Pa., June 14, at which time the tournament will be played for the Drug Exchange Cup. After dinner there will be a floor show. Ray Anderson, Merck & Co., 916 Parrish st., Philadelphia, is the committee chairman.

Merck Holds "Open House"

Merck & Co. was host to about 4,000 visitors on "Employes' Day," May 20. The guests were greeted by president George W. Merck; G. W. Perkins, executive vice-president and treasurer; R. E. Gruber, H. W. Johnstone, Joseph Rosin, vice-presidents; and other officials and executives. Employes and their guests were shown all departments of the plant.

In Larger Quarters

Merz & Co., manufacturers of pharmaceutical products, has leased a 3-story factory building at 30 North Fifteenth st., East Orange, N. J.



Two members of the Industrial Research Institute's recent "Science Tour" in the famous pilot plant of Jones & Laughlin, Pittsburgh, where they are seeing a laboratory expert conduct a hardness test. Standing, left to right, K. R. Brown, Atlas Powder, Tamaqua, Pa., and H. W. Soyer, J. T. Baker Chemical, Phillipsburg, N. J. Group visited Hercules "Labs" at Wilmington, May 15.

Pest Control Group Announces Convention Details

"Clinics" to Occupy Large Portion of 3-Day Meeting In N. Y. City, Oct. 23-25—Large Number of Suppliers Take Space—Luthers Sell Stock in California Spray-Chemical—

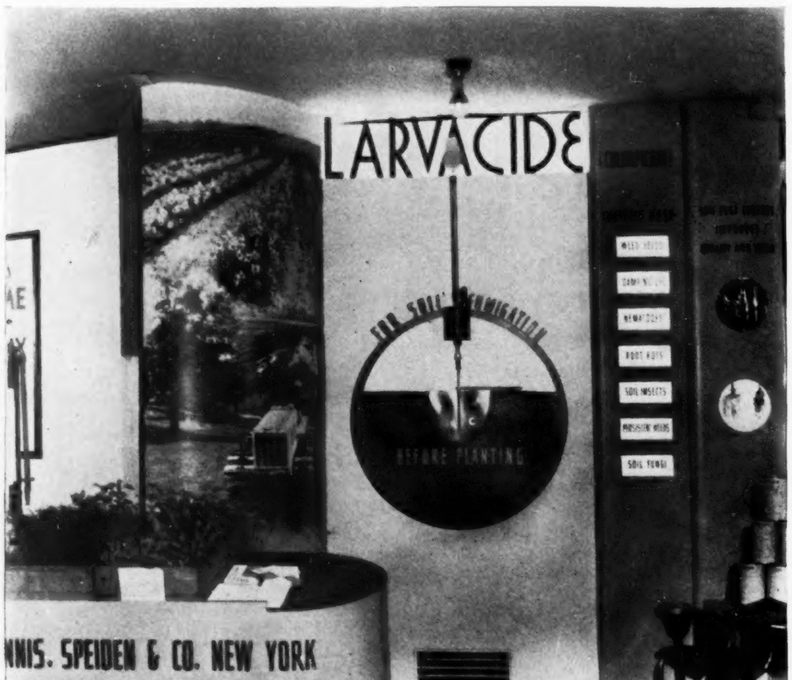
INDICATIONS point to the biggest convention thus far held, as plans are being made for the Convention of the National Pest Control Association which will be held at Hotel Pennsylvania in N. Y. City on Oct. 23-24-25. Committee meetings are being held, interviews arranged with prospective speakers and others who will take part in the program and much correspondence and interest is being manifested.

The 3 complete days from 9:15 A. M. to 5 P. M. will be entirely devoted to general industry business and educational program combining addresses and clinics so as to allow for ample discussion of the problems of pest control. The general method of presentation at the "Clinics" will take the form of "questions and answers" with much emphasis being placed to procure questions in advance so that answers can be properly prepared. Anyone in the industry should feel free to send in their questions or state definite problems and as these are submitted, attention will be given in the preparation of the answers. These should be sent to the secretary of the National Association at 3019 Ft. Hamilton Parkway, Brooklyn, N. Y.

The "Clinics" will deal specifically with the following subjects: Termites, Rats and Mice, Fumigations, Chemicals and Formulae, Moths and Carpet Beetles, Business Routine and Office Management. In connection with these clinics there will be displays and exhibits that will assist greatly in having a better understanding. For example, Dr. E. A. Back of the Bureau of Entomology will have a large display of infested material and other interesting specimens that will help in matters of identifications, etc. The Connecticut Pest Control Association with the cooperation of Neely Turner, state entomologist, will have an exhibit of insects and pests as well as their damage. It is expected that the California Pest Control Association will probably have an exhibit with its emphasis on Termites and Ants. Throughout there are to be given opportunities for discussions and the mere chance to talk with those from the industry coming from all parts of the country will prove helpful.

Dispose of Holdings

E. E. Luther and E. B. Luther have disposed of their holdings in California Spray-Chemical Corp. to Standard Oil of California and Standard Oil of N. J. The Luthers have also resigned from the board of directors of the Spray-Chemical firm, which is now controlled by the latter companies.



Larvacide (chlorpicrin), a leading mill and industrial fumigant for 14 years, is now being introduced to professional and amateur growers for soil fumigation at the N. Y. World's Fair. Innis, Speiden's exhibit is booth 75 in "Gardens on Parade." Visitors certainly should mark it "a must."

News of the Specialties

New Report on Glycerine

A report on experiments with glycerine as an anti-freeze agent, recently received by the Glycerine Producers' Association from Miner Laboratories, Chicago, is a valuable contribution to practical information on this subject. Tests indicate that the addition of small quantities of glycerine to alcohol for anti-freeze purposes results in a substantial improvement in effectiveness.

Corrosion Inhibitors

The action of sodium chromate and bichromate as corrosion inhibitors in refrigerating brine systems is described in a booklet just issued by Mutual Chemical. Copies may be had from company's N. Y. City office, 270 Madison ave.

McCormick Honored

Charles P. McCormick, president, McCormick & Co., Baltimore, has been elected to the directorate of the U. S. Chamber of Commerce. Mr. McCormick, manufacturer of chemical specialties, will represent the 3rd election district.

Personnel and Personal

William A. Waldie has been appointed technical director of New Wrinkle, Inc., Dayton, O. Mr. Waldie heads the company's new Technical Service Dept.

Dr. Anthony D. Diodati is now head of the research staff of Marco Company Laboratory, Philadelphia.

Dr. O. W. Leibiger is now technical director of the textile division of the Atlantic Lacquer Mfg. Co., 31 Cordier st., Irvington, N. J. Dr. Leibiger is a graduate of the University of Lyon in France and the University of Erlangen in Bavaria and has been connected with the dyestuff and textile industry for 20 years.

John C. Martin has left the Ware Shoals Manufacturing Co. to join the Aridye Corp., Fair Lawn, N. J., as sales representative for New England.

Arnold, Hoffman & Co., Inc., has added Philip Lavoie to its staff as technical demonstrator of their various sizing, printing and finishing specialties.

Mr. Ernest Nathan, president, Warwick Chemical, West Warwick, R. I., and Dr. Dale S. Chamberlin, vice-president, sailed in the *Manhattan*, May 3, for Europe.

ADVERTISEMENT—*This entire page is a paid advertisement.*

Published Monthly by U. S. Industrial Chemicals, Inc.

SOLVENT NEWS

Reg. U. S. Pat. Off.

June ★ A Monthly Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★ 1939

Emulsified Gravure Inks Are Water- and Fire-proof; Dry Fast

LONDON, England—The first complete account of new, non-flammable rotogravure printing inks which German chemists have developed from emulsions of manila copal resin, sulphonated oil, ethyl alcohol and water is published here in *Paint Manufacture* in an article by its Berlin correspondent.

The report brings out the point that although the inks contain a high percentage of water (and can be further diluted) they dry tack-free in a few seconds without "striking through" and are waterproof after drying.

Reduce Health Hazard

It is thought that the new inks can replace other types formulated with drying oils, resin and inflammable solvents and thus reduce the health hazard. Press runs, it is claimed, have demonstrated good printing qualities and working properties.

In preparing the emulsions, manila copal resin is dissolved in alcohol and sulphonated oil, dispersed in water with ammonia and triethanolamine, and water-insoluble dyes or pigments added. The finished inks contain about 10% alcohol. Any desired consistency can be prepared, it is claimed.

Anhydrous Alcohol Aids Dry Cleaning Solvents

PARIS, France—The use of anhydrous alcohol in the manufacture of detergent compositions for boosting the cleaning action of commonly used dry cleaning solvents such as trichlorethylene, perchlorethylene and naphtha is disclosed in a recent French patent.

Small amounts dissolve completely in the solvents, increasing their general effectiveness and, because of the dehydrating action of the anhydrous alcohol, the inventor points out, take up any residual moisture that garments tend to absorb from the air under certain conditions to the detriment of the cleaning process.

A typical detergent is made by mixing 30-50 parts of xylol with 15-30 parts of oleic acid, emulsifying the mixture with 10-20 parts of a 20% solution anhydrous ammonia in ethyl alcohol, adding finally 20-50 parts of anhydrous alcohol and 10-20 parts of tetralin.

Anhydrous alcohol is produced by U.S.I.

U. S. Using More Acetate Sheets to Protect Paper

WASHINGTON, D. C.—A sharp increase in the use of transparent cellulose acetate sheeting for the protection of government docuuments is reported in World Trade Notes. Developed several years ago by the National Bureau of Standards, the process was adopted by the U. S. National Archives as the best and only feasible means of protecting their vast amount of documents, the report continues.

The thin, stable acetate sheeting forced into the pores of the paper by heat and pressure is highly transparent, strong, resists insects and is easily cleaned with water.

Check Benzol Poisoning By Taking Doses of Vitamin C

BERLIN, Germany—Additional experimental evidence that doses of vitamin C increase the resistance of humans to benzol poisoning was reported here recently in *Farben Chemiker*.

The same vitamin, lack of which is an important cause of scurvy, also has been used successfully in curing benzol poisoning in animals as well as in humans, it is asserted. A test which determines the amount of ascorbic acid in the urine is suggested for an early diagnosis.

Reveals Dip Process For Decorating Fabric, Paper

CINCINNATI, Ohio—Decoration of fabrics or paper by a flotation process in which a pigment-bearing film of water-repellent solvent is "picked up" from water and deposited in as many as 12 different configurations is described in a patent issued to an inventor here.

The use of water-repellent (but pigment wetting) solvents which evaporate readily makes it possible to dip the decorated fabrics in any suitable resin and incorporate them in laminated sheets without fear of incompatibilities such as formerly occurred when hard-to-remove or reactive gum binders were used to suspend the pigments, the inventor declares.

Suitable water-repellent solvents listed in the patent papers include ethyl acetate, butyl acetate, butyl alcohol, dialkyl phthalates, amyl alcohol. A flotation apparatus is described.

All of the above solvents are produced by U.S.I.

Change New York Phone Number

Effective June 12th, the telephone number of U.S.I.'s New York sales office and executive headquarters will be changed to MUrray Hill 2-6700. The address remains unchanged—Lincoln Building, 60 East 42nd Street, New York, N. Y.

Predict Wider Use Of Ethyl Formate In Coatings, Synthesis

U.S.I. Product Is Vinyl Resin Solvent; Vitamin Intermediate

In two new uses, perhaps the most unusual yet developed, the U.S.I. product, Ethyl Formate, has given chemists of both the surface coatings and synthetic organic chemical fields a revealing glimpse into some of its further possibilities.

As recently as 1935, many investigators had thought of Ethyl Formate principally in terms of its major use as a fumigant and larvacide in the packaging of foodstuffs. Because it evaporates rapidly without residual taste or odor, it is still one of the best agents for controlling the infestation of tobacco, cereals, dried fruits and similar products.

Additional applications for Ethyl Formate then included—and still include—several therapeutic uses, and the manufacture of perfume compounds and synthetic flavoring bases. (Ethyl Formate has a pleasant odor resembling fresh peach kernels.)

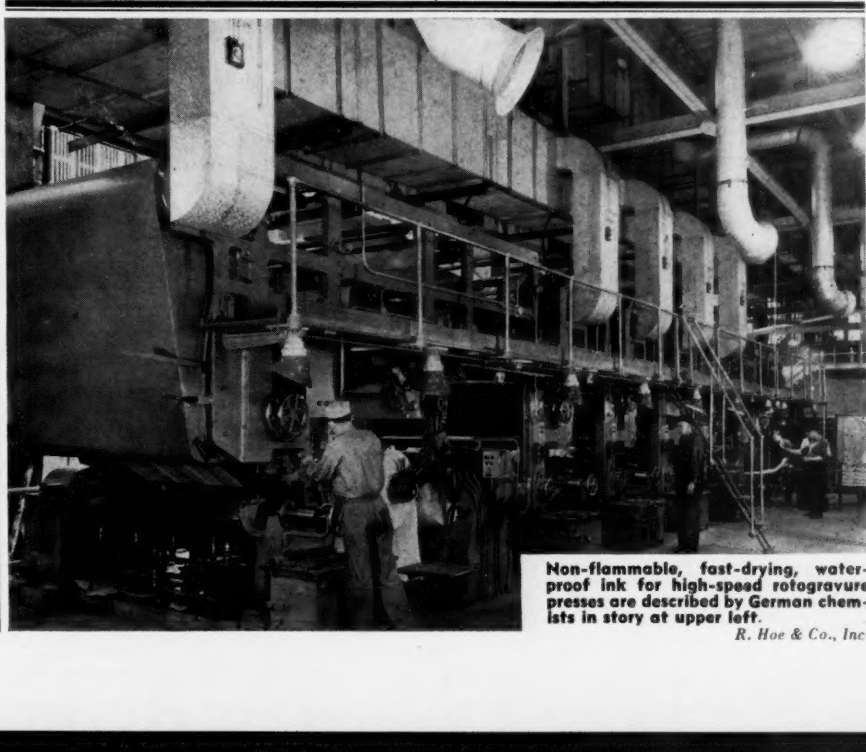
Total Synthesis of Vitamin B_1

However, the potentialities of Ethyl Formate in the organic chemical field became known to most chemists in 1936 when a complete account of one of pharmaceutical chemistry's major achievements—the total synthesis of thiamin chloride (crystalline vitamin B_1)—was published.

Then it was revealed that Ethyl Formate reacted with ethyl beta-ethoxypropionate to yield a crude derivative which, when treated with acetamine hydrochloride, gave 2-methyl-5-ethoxymethyl-6-oxypyrimidine.

By transforming this compound to 2-methyl-5-bromo-methyl-6-aminopyrimidine, a substance bearing a resemblance to the hypnotic, barbital, and combining it with 4-methyl-5-

(Continued on next page)



Non-flammable, fast-drying, waterproof ink for high-speed rotogravure presses are described by German chemists in story at upper left.

R. Hoe & Co., Inc.

June ★ SOLVENT NEWS ★ 1939

Effect of Indirect Lighting on Color Schemes Emphasized

General principles for selecting paint colors to give maximum illumination efficiency are outlined by S. G. Hibben, Westinghouse expert on applied lighting, in a recent article.

"In choosing colors for large painted surfaces likely to affect illumination . . . selection should not depend on eye observations alone," Mr. Hibben maintains. "Often it is possible to select equally pleasing colors and yet have a gain of 10 to 15% in reflecting value."

With modern indirect lighting, "areas above the general level of picture molding should have reflection values of 80% or higher," according to Mr. Hibben. Tests conducted by him under both incandescent and mercury light show that only white paints meet this requirement.

Following nature's outdoor lighting scheme, the horizon zone half as bright as the sky and the lower foreground half as bright as the horizon, he suggests reflection coefficients of about 45% for upper wall surfaces and about 20% for lower walls and floors.

New Coatings, Syntheses Made With Ethyl Formate

(Continued from previous page)

β-hydroxyethylthiazole, a pyridine-like sulfur-containing chemical related to certain rubber accelerators and photographic sensitizing agents, the commercial synthesis of the vitamin was effected.

Along entirely different lines and suggesting still other possibilities is the unique use, according to a recent patent, of Ethyl Formate as a solvent for polyvinyl formaldehyde acetal resins. This application is based upon the discovery that Ethyl Formate was the only solvent which would evaporate almost completely from films, sheets and varnishes of the resins in the curing process.

Contrariwise, solvents such as methyl acetate, ethyl acetate, propyl formate, ethylene chloride and others did not evaporate completely, high percentages being retained except after costly curing.

Ethyl Formate is also an active solvent for several cellulose esters and ethers. It is soluble in most organic solvents and, according to recent work, hydrolyzes at a rate which increases with increments in the mol fraction of water present and decreases with increasing concentrations of hydrochloric acid.

In other organic syntheses with Ethyl Formate, the Claissen reaction is employed. Because of the great reactivity of the keto and carboxy aldehydes produced, this reaction may pave the way to further syntheses.

Ethyl Formate is a standard U.S.I. product. Manufacturers desiring samples or further information for test purposes may secure them by writing to U.S.I.

Gun Sprays Solox-Water Mix to Speed Pressing

Spraying a mixture of Solox, U.S.I.'s proprietary solvent, and water on shirts, pajamas, etc., before ironing not only cuts pressing time in half, but also improves appearance, a large textile company has found. Another pressing operation involves the use of Solox and water for ironing collars lined with "dry" linings to produce a good crease and increase the adhesion.

The automatic spray gun illustrated is particularly suited for both of these applications, according to the manufacturer.

U.S.I. will be glad to supply the manufacturer's name as well as information on Solox.

Alcohol Treatment Gives Sharper Offset Printing

WASHINGTON, D. C.—How sharper offset printing plates can be obtained by first pretreating with alcohol the proteins employed in the photographic emulsion is revealed in a patent awarded here.

Pretreating the proteins with warm alcohol makes the developer tan them to a greater degree and in shorter time with the result, declares the inventor, that non-exposed parts of the emulsion are more readily washed out and yield reliefs with higher contrast when 70% alcohol is applied after developing.

The process is said to combine the advantages of the bichromate films and the highly sensitive photographic plates hitherto used.

A ready-reference vitamin chart defining all the standardizing units in current use as well as approximate equivalents and conversion factors may be secured free of charge by writing to U.S.I. Ask for Bulletin 120.

TECHNICAL DEVELOPMENTS

Further information on these items may be obtained by writing to U.S.I.

A rust-preventing, rapid-drying, lubricating coating for steel consists of graphite, between 93% and 96% pure carbon, ground to about 325 mesh, in a vehicle containing no lead or varnish, the manufacturer announces. Protection of steel surfaces which are stored, then shipped in a limited time, is a suggested application. **(No. 220)**

U S I

Crateless aluminum carboys for shipping acetic acid, formaldehyde, essential oils, wetting agents, soft drink syrups, vitamin concentrates, and other non-regulatory chemicals have the same 13-gal. capacity of glass-and-wood units, but weigh only 16 lb. instead of 65, an announcement states. The containers are not harmed by spillage and overflow, the report continues, and are fitted with flat-top, folding handles for easy handling and stacking. **(No. 221)**

U S I

A "non-skid" abrasion-resistant finish containing 8 lbs. of refractory pigment per gallon of varnish vehicle is described as exceptionally suitable for conveyors, chutes, blades of blower and ventilating fans, grain slides, etc. When coated over smooth concrete, terrazzo, marble, wood and steel stairs and floors the coating is said to provide low cost assurance against slipping. **(No. 222)**

U S I

A very small, light-weight moisture detector indicates when wood or plaster is in proper condition for painting and may be used by paint manufacturers to ascertain the reasons for peeling or blistering, a recent announcement states. The device is said to be direct reading, more sensitive and easier to use than previous models. **(No. 223)**

U S I

A primer for rusty surfaces saves the expense of sandblasting or cleaning and by its sealing action prevents further rusting of the metal, making it safe for the application of any finish paint coat, the manufacturer states. **(No. 224)**

U S I

A suede-like surface is produced by a new lacquer finish, the manufacturer claims. He recommends it for work where no light reflection is desired and as a "roller coat" on wall board. Several pastel shades are available. **(No. 225)**

U S I

A new commercial odor absorber with an activated carbon "filter" which can be reactivated when necessary, is said to remove completely the odors of hydrogen sulphide, sulphur dioxide, solvents, gasoline, chlorine, body odors, etc., from entrance or exhaust air. By assembling the necessary number of units any volume of air and degree of odor concentration can be handled, the manufacturer states. **(No. 226)**

U S I

Preservation of blueprints, charts and maps is claimed for a new "dry" backing cloth. Requiring no adhesive, the backing is applied with a hot iron, seals paper against moisture and is permanently flexible, according to the manufacturer. **(No. 227)**

U S I

Porous hard rubber containing openings 2 to 5 microns in diameter has been developed for filtration work, a recent announcement states. Several thicknesses are available. **(No. 228)**

U.S. INDUSTRIAL CHEMICALS, INC.

60 EAST 42ND ST., N.Y. U.S.I. BRANCHES IN ALL PRINCIPAL CITIES

A SUBSIDIARY OF U. S. INDUSTRIAL ALCOHOL CO.

ALCOHOLS
- Amyl Alcohol
- Butyl Alcohol
- Fusel Oil—Refined
- Methanol

Ethyl Alcohol
- Anhydrous
- Absolute
- C. P. 96%
- Pure (190 proof)
- Specially Denatured
- Completely Denatured
- U. S. I. (Denatured Alcohol Anti-freeze)
- *Super Pyro Anti-freeze
- *Solox Proprietary Solvent

***ANSOLS**
- Ansol M
- Ansol PR

ESTERS, ACETATES
- Acetic Ether
- Amyl Acetate
- Butyl Acetate
- Ethyl Acetate

ESTERS, ETHYL
- *Diatol
- Diethyl Carbonate
- Diethyl Oxalate
- Ethyl Chlorocarbonate
- Ethyl Formate
- Ethyl Lactate

*Registered Trade Mark

ESTERS, PHTHALATES
- Diamyl Phthalate
- Dibutyl Phthalate
- Diethyl Phthalate
- Dimethyl Phthalate

OTHER ESTERS
- Amyl Propionate
- Butyl Propionate
- Dibutyl Oxalate

INTERMEDIATES
- Acetoacetanilid
- Acetoacet-o-chloranilid
- Acetoacet-o-toluidid
- Ethyl Acetoacetate
- Sodium Ethyl Oxalacetate

ETHERS
- Ethyl Ether
- Ethyl Ether Absolute—A.C.S.

OTHER PRODUCTS
- Acetone, C.P.
- Butyl-mesityl-oxide-oxalate
- Cellulose Acetate
- Collodions
- *Curbay Binders
- *Curbay X (Dried Curbay)
- *Derex
- Ethylene
- Methyl Acetone
- Nitrocellulose Solutions
- Potash, Agricultural
- *Vacatone

Solvents

Shipments Show Seasonal Drop in May

Coatings Manufacturers Curtail—Amyl Acetate, Ex-Fusel Oil and Diamyl Phthalate Advanced—Isobutyl Alcohol Lowered—Du Pont Company To Make Ethylene Glycol—

COATINGS manufacturers curtailed operations somewhat in the last two weeks of May. This was due partially to the development of labor trouble in the Detroit area and also to normal seasonal influences. Despite the adverse effect of the Briggs Body strike, output of automotive units in May reached 300,000 units, just about equal to earlier expectations. Retail sales, estimated as high as 325,000 units for the full month, advanced contra-seasonally over April and were decidedly better than was hoped for a month previously. Dealer stocks of new cars dropped by some 60,000. In the face of this optimistic news it is a strong possibility that the seasonal drop in June and July may not be as sharp as the industry has anticipated. All this, of course, has a bearing on the solvents.

Higher Solvent Prices?

Advances in amyl acetate and diamyl phthalate were announced last month. These increases were taken in some quarters as an indication that the rather soft price position of solvents was changing and that higher prices for additional items might be expected.

Quotations on amyl acetate, ex-fusel oil, were advanced 1c. On the new basis 90-95% technical grade in tanks delivered is quoted at 10½c, while carlots, drums, are 11½c. No change was made in the quotations on amyl acetate, ex pentane. A 2c increase was made in diamyl phthalate, making tanks 20c and carlots, drums, 2c higher.

Isobutyl alcohol, on the other hand, was lowered 7/10c per lb. Drums, carlots, works, freight allowed east of the Rockies, are now 7.3c, while tanks are 1c lower. L.C.L. quantities are 7.8c.

A generally steady tone was in evidence for the petroleum solvents and demand held up well over the period under review. The only price changes were:—1c decline in the f.o.b. New Jersey refineries' quotations on high-solvency aromatic No. 1, cleaners' naphtha, making the new level 15c per gal.; 2c decline in No. 2, making the new price 16c.

April Alcohol Statistics

April production of ethyl alcohol totaled 17,858,504 proof gals., about 400,000 gals. above the March figure of 17,422,863 gals. April '38 output was comparatively small, amounting to only 12,816,786 gals.

Production of C. D. in April was 240,918 wine gals., substantially under that in March, 504,866 gals., and slightly under the April '38 total of 297,743 gals. April removals of C. D. came to 184,319 gals., less than half the quantity removed in March, 480,383 gals. April '38 removals totaled 300,348 gals. At the end of April 511,723 gals. remained on hand, as compared with 456,115 gals. in March; April '38 stocks amounted to 546,055 gals.

Important Price Changes

ADVANCED	May 31	Apr. 30
Amyl acetate, ex fusel oil,		
85-88%, tks.	$0.11	$0.10
carlots	.12	.11
tech., 90-95%, tks.	.10½	.09½
carlots	.11½	.10½
H. T., 85-88%, tks.	.12½	.11½
carlots	.13½	.12½
Diamyl phthalate, tks.	.20	.18
carlots	.21	.19
DECLINED		
Alcohol, spec. solvent,		
drs., N. Y.	$0.25	$0.26½
Alcohol, Isobutyl, tks.	.063	.07
carlots	.073	.08
High-solvency aromatic		
No. 1, N. J.	.15	.16
No. 2	.16	.18

S. D. In Greater Demand

S. D. formulae again showed an increase in April's production figure of 7,477,590 gals., when compared with 7,110,717 gals. produced in March; in April '38 the output was 5,988,829 gals. For the 10-month period beginning July '38, the total production of S. D. was 68,463,342 gals. In the like period of 12 months earlier were produced 58,443,690 gals.

Alcohol quotations are still spotty. Early in the month a 1½c reduction in the drum price in the N. Y. Metropolitan Area was made for special solvent. This action was directly attributed to keen competition in that local section and did not spread into other territories. No price change was made in the tankcar quotation.

COMING EVENTS

American Water Works Association, 59th Annual Convention, Atlantic City, N. J., Hotels Ambassador and Chelsea, June 11-15.

American Pulp & Paper Mill Superintendents Association, Washington, D. C., Wardman Park Hotel, June 13-15.

Golf Tournament, Salesmen's Association of the American Chemical Industry, Ridgewood Country Club, Ridgewood, N. J., June 15.

American Electro Platers Society, Asbury Park, N. J., June 19-22.

A. C. S., Symposium of Division of Physical and Inorganic Chemistry—Joint Symposium with University Wisconsin, Madison, Wis., June 20-22.

American Society for Testing Materials, 42nd Annual Meeting, Chalfonte-Haddon Hall, Atlantic City, June 26-30.

16th Colloid Symposium, Division of Colloid Chemistry, Stanford University, Calif., July 6-8.

American Pharmaceutical Ass'n, 87th Annual Convention, Biltmore Hotel, Atlanta, Ga., August 20-26.

American Mining Congress, Sixth Annual Metal Mining Convention & Exposition, Western Division, Salt Lake City, Utah, Aug. 28-31.

A. C. S., 98th Meeting, Boston, Mass., Sept. 11-15.

National Petroleum Association, Atlantic City, N. J., Hotel Traymore, Sept. 13-15.

American Gas Association, Annual Convention, N. Y. City, Oct. 9-10.

National Safety Congress & Exposition, Atlantic City, N. J., Oct. 16-20.

American Public Health Association, William Penn Hotel, Pittsburgh, Pa., Oct. 17-20.

National Pest Control Ass'n, 7th Annual Convention, Hotel Pennsylvania, New York City, Oct. 23-24-25.

National Paint, Varnish & Lacquer Association, Annual Convention, Hotel Fairmont, San Francisco, Nov. 1-3.

American Petroleum Institute, 20th Annual Meeting, Stevens Hotel, Chicago, Nov. 13-17.

American Society of Mechanical Engineers, Philadelphia, Pa., Dec. 4-7.

17th Exposition of Chemical Industries, Grand Central Palace, N. Y. City, Dec. 4-9.

A. C. S., Eighth National Organic Chemistry Symposium, Division Organic Chemistry, St. Louis, Mo., Dec. 28-30.

New Ethylene Glycol Maker

Du Pont will immediately build a plant for the production of ethylene glycol at the Belle, W. Va., works. New plant is expected to be in production in 1940. The ethylene glycol produced will supply the company's requirements for this material and, moreover, will be sold for use as an anti-freeze by its "Zerone" Division. This new construction project is the second at the Belle works to be announced within the year.

Standard Builds Laboratory

Standard Oil of N. J. will build a new process laboratory at its Bayway Refinery in Linden, N. J. New structure, to cost an estimated $5,000, will be one-story, of brick and steel fireproof construction.

¶ "Encourage men to work and capital to produce."—Lammot Du Pont in statement to stockholders—

Federal financial policies were vigorously assailed May 25 by Lammot Du Pont in a statement addressed to "Stockholders, Employes and Friends of E. I. du Pont de Nemours & Company."

Asserting that true recovery can be achieved only by the time-tested method of encouraging men to work and capital to produce, the chemical company's president called for an immediate lifting of present tax burdens which, he declared, are confiscatory in their effect. Our spending program, he added, has produced, not recovery, but paralysis and fear.

Mr. Du Pont quoted from a statement he issued April 8, 1932, in which he urged his readers to make known their feelings to their Congressmen, pointing out that the ways and means of curtailing governmental expenditures are the responsibility of Congress. Then he closed his communication with the following:

"Personally, I feel that your Senators and Congressmen will welcome your expression of opinion on this all-important subject. They know full well the importance of prompt action on this matter. They know the dire consequences if such action is not taken."

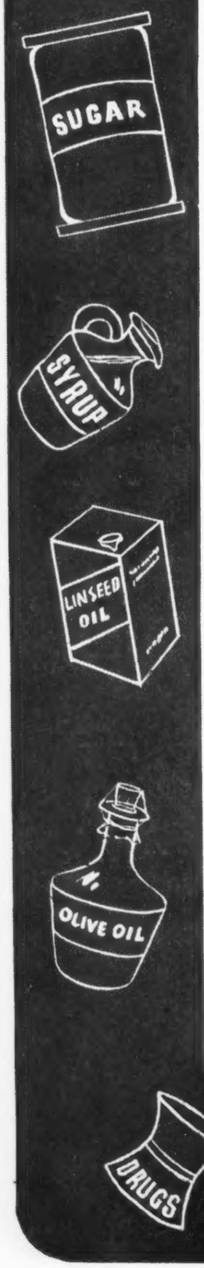
Purify with

NUCHAR

ACTIVATED CARBON

Removes

ODOR · COLOR · TASTE



The Use of Nuchar Activated Carbon for

CHEMICALS AND PHARMACEUTICALS

A brief description of a few of the many applications of activated carbon in the chemical and pharmaceutical field.

Phosphoric Acid and Phosphates

When produced by the treatment of crude phosphate rock with sulphuric acid, a phosphoric acid containing organic coloring material results. By the application of NUCHAR, it is possible to obtain an almost complete decolorization on this acid. In the manufacture of di-sodium phosphate, a light brown solution is obtained. Activated carbon reduces very considerably this color and enables the manufacturers to turn out a product which compares very favorably with other high grade technical qualities.

Tartaric Acid

The principal source of this chemical is argols, obtained as a by-product in the aging of wines. After conversion of the tartrate from the argols to tartaric acid, the purification procedure is one of crystallization. The procedure usually followed is first a primary crystallization. These crystals are then redissolved, treated with activated carbon for decolorization, and also with calcium ferro cyanide to precipitate the iron. The calcium, which goes into the solution, is reprecipitated by the addition of carbon dioxide. This solution is then filtered and allowed to crystallize, yielding a nice white crystal. High grade cream of tartar and other tartrates can be made from this acid. The use of NUCHAR activated carbon in this way eliminates a number of recrystallization steps.

Subsequent advertisements will discuss other basic purification principles of Activated Carbon.

INDUSTRIAL CHEMICAL SALES

DIVISION WEST VIRGINIA PULP & PAPER COMPANY

230 Park Avenue - - - New York

CHICAGO	PHILADELPHIA	CLEVELAND
35 E. Wacker Drive	1322 Widener Bldg.	417 Schofield Bldg.

Raw Materials

Paint Oils in Good Demand; Prices Higher

Chinawood Leads Advances—"Hand-to-Mouth" Buying Still Dominates Markets for Natural Tanstuffs—Carnauba Wax Firmer—Naval Stores Lose Ground—Shellac Unchanged—

MOVEMENT of raw materials, including oils and fats, into consuming channels was spotty throughout the period under review. As a general thing purchasing was still largely of a "hand-to-mouth" type with buyers unwilling yet to contract ahead in any major way. Operations in the textile and leather fields have given definite indications of curtailment, hence consumers are not overly anxious to acquire larger inventories unless price concessions are offered.

Price changes in the natural tanning materials and natural dyestuffs were mixed. Spot stocks of non-fibrous mangrove bark were scarce and quotations were advanced sharply. Higher prices were announced for Gambier, gall nuts, Myrobalans J1 and J2, and also for tumeric. Slightly lower levels were set for ground and leaf Sicilian sumac. Several cuts were made in valonia cups. Tapioca flour was advanced to 2¼c-4c per lb., based on reports of small crops in the principal producing countries.

Chinawood Spot Stocks Short

Chinawood again went higher, continuing the advance of the last few months. Importers are not at all sure when deliveries from the primary source can be made and for part of the month certain importers were out of the market completely. The supply of spot stocks available have dwindled considerably in the last few months in the face of fairly heavy demand. In sympathy with the rise in Chinawood, most of the drying oils have moved into higher price levels. Crude coconut was advanced slightly, but on the other hand, crude corn was off somewhat from the April close. Quotations on the principal fish oils and the more important animal fats and oils continued generally steady and for the most part unchanged.

Carnauba, Japan Waxes Up

A greatly improved demand was in evidence for Carnauba wax last month and prices were speedily advanced. This trend was expected and commented upon in the last issue. Higher prices were also reached in Japan wax, despite only a fair amount of buying interest.

Demand for shellac declined somewhat from the March-April level. The price structure, however, showed very little, if any, change from the previous month. The market for natural varnish gums moved into higher price ground for several important items and this is commented upon more fully in the Pigments Market Section.

Important Price Changes

ADVANCED	May 31	Apr. 30
Gall nuts, Alleppo	$0.22½	$0.22
Gambier, cubes,		
Singapore	.08½	.08¼
plantation	.08¼	.08
Mangrove bark, non-fibrous	26.00	24.75
Myrobalans, J 1,	25.00	24.00
J 2	19.00	17.00
Oil babassu	.06⅜	.06⅛
Oil Chinawood, drs.,	.17¾	.16¾
tks.	.17	.164
Oil coconut, crude, tks.	.03⅜	.03⅛
Oil linseed, boiled, tks.	.088	.086
Oil oiticica, drs.	.11½	.10½
Tumeric, Alleppy	.06¼	.06
Madras	.06¾	.06½
Tapioca Flour	.02¼	.01¾
Wax Candelilla	.15½	.15¼
Carnauba, No. 3 chalky	.30	.27½
Japan	.11¼	.11
DECLINED		
Mangrove bark, fibrous	$24.00	$24.75
Oil corn, crude, tks.	.05⅞	.06
Oil sardine, crude, tks.	.33	.34
Sumac, grd., Sicilian	66.50	67.00
leaf	69.00	70.00
Valonia cups	29.00	32.00
beards	46.00	47.00
Wattle bark, African,		
E. Africa	34.50	34.75
S. African	38.00	38.25

Turpentine quotations went still lower in the primary markets last month and the same thing is true of most grades of gum rosin. There is a noticeable absence of worthwhile inquiries for export and the domestic market has also lagged. Buyers appear to be unwilling to purchase for anything more than immediate replacement needs, unless sizable concessions are made. While the news of the government plan for loans was expected to bolster the market for naval stores, this so far at least, has failed to provide much, if any, strength to the price structure. The uncertainty and delays in actual payments to producers has had a definite unsettling effect. Movement of rosin and turpentine from the interior so far this season has been below normal due to abnormal weather conditions.

DR. FRANCIS C. FRARY

Aluminum Co. of America's director of research will this fall receive the '39 Edward Goodrich Acheson Medal of the Electrochemical Society.

Tax Exemptions for "Alky-Gas"

Hearings are currently being held in Washington on a bill which proposes to exempt from the 1c Federal gasoline tax, "alky-gas" blends intended for motor fuel. A subcommittee of the senate finance committee is reviewing the measure, which has the support of Dr. William J. Hale, and the members of the National Farm Chemurgic Council. Dr. Hale, Karl H. Wilkin, secretary, Raw Materials National Council, Sioux City, and Dr. Leo M. Christianson, formerly with National Farm Chemurgic Council, have appeared in favor of the bill before the subcommittee. Opposed are Senator Connally (Tex.), member of the committee, George Barton, director, Chicago Motor Club, Thomas J. Keefe of the A. A. C., Kirk Fox, editor, *Successful Farming*, Des Moines, and others. At later hearings, members of the U. S. Dept. of Agriculture, which has published "Motor Fuels from Farm Products" as an official bulletin, may be asked to testify.

Places Construction Contract

The Sordoni Construction Co., Wilkes-Barre, Pa., has been awarded the contract to construct the Eastern Regional Research Laboratory to be located at Wyndmoor, Montgomery County, Pa.

This contract calls for the completing in 400 calendar days of the entire administration unit, together with 9 sections of the chemical laboratory wing, and the entire service building and power plant, for the amount of $842,000.

Science of Chemurgy

The new science of Chemurgy is discussed in the June issue of *Priorities* published by Prior Chemical Corp., N. Y. City. Numerous instances are cited of the conversion of farm products into articles of commerce by the application of chemistry and the probable influence on agriculture of this rapidly developing movement is briefly portrayed. The crop program of the farmer of the future is pictured as being influenced by the market outlook for automobiles, textiles, paints, toilet articles, etc., quite as much as it is today by the prospective demand for beef and bacon or by drought in the Argentine, war in Europe or famine in India.

Oil Trades To Golf

Oil Trades Association of N. Y. will hold its golf tournament June 13 at the Pelham Country Club, Pelham Manor.

Agricultural Chemicals

Dullness Prevails in Raw Fertilizer Markets

Industry's Interest Centers In 15th Annual Meeting—Mixed Fertilizer Sales and Price Structure Hold Up Well—Exports, Imports Continue to Decline—Drop in Sulfate Output—

WITH the mixing season in the South practically over, the markets for raw fertilizer materials presented a very dull and lifeless picture in the past 30 days. What little business was transacted was for small replacement lots and the volume of this type of business was rather disappointing to the suppliers. In the Midwest heavier purchasing was in order. Likewise, this was the situation in the Northeast.

Movement of mixed fertilizer in the last thirty days was fairly satisfactory, but a considerable portion of this was probably tonnage which normally would have moved into consuming channels earlier in the year except for the wet and cold spring experienced in the South and Southwest. The price structure has held up remarkably well with only a few isolated spots reported where price-cutting has developed.

With little in the way of inquiries around in the market prices were largely nominal in character. Imported nitrogenous material moved into slightly higher ground, but the general tone of most of the organic ammoniates was one of easiness. Imported bone material was reduced gradually during the period under review and at the month-end was quoted at $24 per ton.

Important Price Changes

ADVANCED	May 31	Apr. 30
Nitrogenous material, imp.	$2.50	$2.40
DECLINED		
Blood, dried, Chgo.	$2.50	$3.00
Bone, raw, imp.	24.00	26.00
Tankage, grd., N. Y.	3.00	3.25
ungrd., N. Y.	3.50	3.55

N.F.A. at White Sulphur

The National Fertilizer Association's 15th annual meeting at White Sulphur Springs got under way early in June with over 500 fertilizer manufacturers, soil scientists, and agricultural leaders in attendance.

W. T. Wright, N.F.A. president, told the Association that continuing aggressive work in soil improvement must be carried on by the industry. "The industry cannot prosper unless the farmer prospers, and the farmers on one-sixth of the cultivated land of the Nation cannot prosper without the use of fertilizer. It is to the advantage of both the industry and agriculture to work for the most efficient and economic use of fertilizer on the varied soils of the country."

Charles J. Brand, executive secretary and treasurer of the N.F.A., in his address on "Industry Problems of Today," touched on the current investigation by the Dept. of Justice of the industry's trade practices. "This is an industry which is dominated by the laws of chemistry, physics, and biology," said Mr. Brand "The same immutable rules govern the fertilizer industry that govern the 60,000,000 acres of fertilized land on the farms of the country. These natural laws force the industry into an inevitable pattern."

"Because of the complexity of the scientific laws which control the industry, there arise many popular misconceptions concerning it," he added. He pegged the inaccuracy of the story that fertilizer prices are high and out of line with other products by quoting indexes compiled by the Dept. of Agriculture for prices paid by farmers for commodities in March, 1939, which showed fertilizer prices to be lower than any commodity in daily use by farmers, with the exception of feed.

Mr. Brand said that recent scientific developments in both the manufacture and use of fertilizer have established economies which are reflected in lower costs and higher yields for farmers.

The convention also heard an address by David H. Colcord, president, Haskell-Oberlin Co., Marengo, Ill., on "Creative Selling." Mr. Colcord talked of selling in terms of fitting a complex product to a complex use.

The convention was also addressed by C. C. Concannon, chief of the Chemical Division, Bureau of Foreign and Domestic Commerce of the United States Dept. of Commerce, who talked on foreign trade.

April Tag Sales Show Gain

Fertilizer sales in April in 17 states totaled 1,315,134 tons. This was an increase of 19% over April of last year but somewhat less than two years ago. The increase for the month more than offset the decline which had been registered in the first quarter.

Tag sales in the first 4 months of this year were the largest for the period since 1930, with the exception of 1937. January-April sales in the past two years have been about a million tons less than in 1929-1930. Most of this decline is accounted for by the decreased amount of fertilizer used on cotton. Increased consumption in the remainder of the country has about offset the decline in the Cotton Belt.

A 22% gain in the South over last year reflected the late season in that area. April tag sales in the 12 Southern States were only 206,964 tons less than in March, while the March to April seasonal drop was 475,589 tons in 1938 and 423,811 tons in 1937. Seven States in the group reported increases over April 1938. The most important decline took place in Florida.

Sales in the South in the January-April period exceeded the corresponding period of last year by 4%, with Alabama reporting the largest increase. North Carolina sales have also been well above last year and are only moderately lower than 1937.

April sales in the Midwest were a third lower than last year, with Missouri the only one of the 5 States to show an increase.

March Exports—123,687 Tons

Exports of fertilizers and fertilizer materials in March totaled 123,687 long tons, with a valuation of $1,540,194. Compared with March of last year there were declines of 28% in tonnage and 8% in value. Potash exports were sharply higher than last year and ammonium sulfate shipments were somewhat larger. These increases were much more than offset by declines in other nitrogenous chemicals, rock, and superphosphate.

Export tonnage in the first quarter of the year was 25% below the corresponding period of '38 but it was well above the January-March period of '37. Only increase over last year has been in potash exports. Decline in hard rock has been slight but most other materials have shown marked decreases. Nitrogenous material exports have only been 42% as large this year as last.

Curtis Addresses P. A.'s

Prophesying an era of discovery and development in the field of chemistry and allied sciences which will be greater than any yet experienced, Francis J. Curtis of St. Louis, director of development for Monsanto Chemical, on May 23 addressed the annual convention of the National Association of Purchasing Agents at San Francisco on "the impact of chemical development on business policy."

"Development of the chemical industry in the last 20 years has been so phenomenal that we can hardly believe it ourselves and spend most of our time wondering what is going to happen next," said Mr. Curtis. "The rate of change in the chemical industry is extraordinary, and those processes which are 5 years old are looked upon with suspicion and those 10 years old can almost be assumed to be out of date. Yet all these coming events cast their shadows before, and to some extent, at least, it is possible for us to foresee today some of the chemical developments of tomorrow which are going to affect profoundly our everyday living."

Coal-Tar Chemicals

Solvent Prices Extended Unchanged to Dec. 31

Imported Cresylic Reduced Further—Improved Demand For Creosote—Weather Retards Naphthalene Sales—Seasonal Let-Down in Dyes—Upturn in Coking Operations Expected—

OUTSTANDING news in the coal-tar chemicals last month were the announcements by producers of coal-tar solvents of the extension of current contract prices to Dec. 31 for benzol, solvent naphtha, toluol, and xylol. There was some little doubt in market circles that the producers would renew prices unchanged, due to the fact that supplies of the principal solvents have been none too plentiful because of the restrictions in coking operations for the past several weeks. Producers have not experienced any great difficulty in keeping abreast of current domestic needs, but buyers for export purposes have found some difficulty in getting material for prompt shipment.

Imported Cresylic Declines

Further weakness developed in imported cresylic and pale grade was said to be available at 48c, a decline of 3c from previous quotations. This action had an unstabilizing influence on domestic material, but no price changes were announced. With little demand in evidence for crude naphthalene, importers reduced quotations to $1.60. As this is the off season for this item the price structure was largely in a nominal position. Sales of refined in the usual merchandising channels for moth protection purposes were said to be not as heavy as expected and the cause was the unseasonal weather.

Steady demand was noted for shipments of cresols and phenol. Synthetic resin manufacturers continue to operate under good production schedules. Producers of coal-tar disinfectants are busy and withdrawals of raw materials for this purpose are satisfactory. An improvement in the demand for creosote was noted, with the railroads and public utilities stepping up their demand.

The call for dyes was not up to the levels experienced in March or even in April, but the volume is still quite a little ahead of the corresponding period of '38. Further curtailment is looked for over the next 60 days, based largely on the assumption that the textile industry will experience additional reduction in manufacturing operations. The price structure, however, remains firm and unchanged. Some slackening in the demand for the principal intermediates was in evidence.

The upturn in steel operations is expected to force a turn in coking operations, which in turn, will make available more coal-tar crudes. As a result, there is now less fear that shortages in certain of the coal-tar chemicals will develop.

Important Price Changes

	May 31	Apr. 30
ADVANCED		
None		
DECLINED		
Acid cresylic, imp., pale	$0.48	$0.51
Naphthalene, crude, imp.	1.60	1.65

Output of by-product coke in April amounted to 2,914,660 tons, 15.2% less than in March, when 3,438,537 tons were produced. In April '38, 2,436,264 tons were produced.

Calco Installs Filters

Agreement is reported to have been reached between the N. J. State Water Policy Commission and Calco to install new filters near its plant to meet New Jersey State Dept. of Health requirements without conflicting with regulations of flood control agencies.

A temporary sedimentation plant had been set up by Calco to prevent polluting the Raritan River. Found insufficient, the plant was to be replaced by larger plants, but officials were informed that would interfere with flood control activities.

Plants resultingly agreed upon at a meeting in Trenton May 10 call for two large sedimentation plants out of the flood control area and not interfering with rights of other property owners. The plants, according to announcement, would be west of the main Calco building and east of the river.

Bothamley With Campbell

John Bothamley is now southern representative of John Campbell & Co., Inc. He will cover the entire south with headquarters in Atlanta. Mr. Bothamley is well known to the textile industry. He was southern manager of H. A. Metz & Co. for 13 years and was also connected with A. Klipstein & Co. as southern sales representative.

Changes at Nord & Schulich

According to an announcement made recently by S. Nord, president of Nord & Schulich, Inc., Newark, N. J., Reuben Schulich, formerly secretary and treasurer, is no longer connected with the company.

News of Monsanto

The Monsanto, Tennessee, and the Nitro, West Virginia, plants of Monsanto Chemical were awarded on May 24 the Monsanto starred pennant at the outstanding American operations in cleanliness, general appearance, landscaping, safety precautions, locker and wash rooms, fire protection and other facilities for the service and protection of employes. The Tennessee plant won for the second consecutive time.

According to a statement in the *Trenton (Mich.) Times* of May 19, Monsanto Chemical may build a large plant on 160 acres near Trenton (Mich.), on which Monsanto is said to hold an option.

B. & P. Opens K. C. Office

Barada & Page, Inc., Kansas City, Mo., has opened a new branch office and warehouse in Dallas, Tex., under the management of A. S. Barada, Jr., vice-president.

Silicate and Fiberboard

Engineering Research Bulletin No. 28 recently issued by the Dept. of Engineering Research, University of Michigan, describes the results which D. W. McCready, professor of chemical engineering, and D. L. Katz, associate professor, have secured to date in their study on the strength properties of corrugated fiberboard. Bulletin describes a number of tests which have been examined as means for evaluating various strength properties of fiberboard. Copies may be secured from the Sodium Silicate Manufacturers' Institute, P. O. Box 138, Philadelphia.

Obituaries

A. E. Wells, Cyanamid Director

A. E. Wells, 55, a director of American Cyanamid, died May 24 in Boston, Mass. Mr. Wells was born at Saxonville, Mass., in 1884. He received his B.S. from M. I. T. in '06, and was a metallurgist with American Smelting & Refining, N. Y. City, from '06 to '13. Mr. Wells devoted the following six years to consulting work and, from '26 to '29 was professor of non-ferrous metallurgy at Harvard. In June, '30, he became associated with American Cyanamid; among his duties at the time of his death was that of general manager, Beetle Products Division.

Other Deaths of the Month

Alfred J. Keppelman, 75, died May 1, at West Orange, N. J. He was formerly Eastern general manager for Farbenfabrik of Ebberfeld, German dyestuffs manufacturer.

Dr. Arthur Van Henry, 47, head of the department of ceramic engineering, Georgia School of Technology, May 22, at Atlanta.

Herbert B. Baldwin, 74, retired chemist for Newark (N. J.) Board of Health, died May 14 at East Orange, after a brief illness.

Pigments and Fillers

Wet Weather Slows Retail Paint Sales

Demand For Industrial Coatings Satisfactory—No Announcement As Yet On Last Half-Year Pigment Prices—Varnish Gums Firmer—Excellent Demand For Zinc Oxides—

WHILE the volume last month in raw paint materials was somewhat below earlier expectations, the total was fairly satisfactory to suppliers. The weather during most of the 30 day period was not very conducive to outside work. A last minute spurt in sales has aroused hope that June sales will be above the seasonal level. With construction work heavy, there is every reason to suppose that painting operations will be satisfactory over the next few months and therefore, paint manufacturers will be forced to enter the market for replacements in good volume. Excellent demand was in evidence for the chemical colors.

Price stability marked most markets. Further firmness in casein was reported and not only was the domestic material advanced in price but increases were made in Argentine and French casein. Demand has been satisfactory and the surplus of supplies has been reduced to a more normal state.

The decided firmness in the varnish gums in the last 30-60 days was further intensified and several important advances were announced last month. Cables from primary sources indicate that suppliers have taken a firm position on new business. Buyers here have been quite active and an appreciable amount of business was said to have been placed in the last 4 weeks. Among the price advances were: a ¼c increase in Batu chips with the new price level quoted at 4c; Batu nubs and chips up a similar amount, also to a 4c level; Philippine bold pale nubs up ⅜c to 10¾c; bold pale chips up ⅝c to 9⅛c; and seeds and dust up ¼c to a basis of 6⅛c.

Red Vermilion Declines 5c

On the downward side of the market the weakness in quicksilver caused a decline of 5c in red vermilion. Not all of the producers at the close of the month were quoting $1.61 and some confusion existed in the market.

Price stability was greatly in evidence in the pigments. No change occurred in the lead pigments or in zinc oxide. Call for the latter was specially heavy. A fairly good volume of shipments was reported for carbon black. Earth pigments were also in good demand. No indication has yet been given by suppliers on what if any changes will be made in the general pigment price structure over the balance of '39. Producers of carbon black report that the current prices are well below production costs but it is a question whether the manufacturers can make any upward price revision on July 1.

Important Price Changes

	May 31	Apr. 30
ADVANCED		
Casein, 20-30 mesh	$0.07¼	$0.07
80-100 mesh	.07¾	.07½
Argentine	.09	.08¾
French	.09½	.09¼
DECLINED		
English vermilion	$1.66	$1.71

Inert pigments, fillers and extenders moved into consuming channels at a good rate in the past 30 days and this trend is expected to continue at least during June. A somewhat firmer market for ester gum was in evidence, but as yet no indication of any advance in the near future has been given by the producers.

Manufacturers of industrial coatings have been enjoying good business, due to the maintaining of fairly heavy production schedules in the automotive field. The strike at the Briggs' plant last month interrupted output and all indications now point to a lessening in activity in the Detroit area in the next 30-60 days with August likely to be the year's low point. The best current estimates of automobile production for the second quarter place the figure at 900,000 units, which would represent a decline of 15% from the 1,055,000 units of the first quarter, but it would be more than 40% higher than the figure for the corresponding quarter of '38.

Crane Re-elected

Clinton H. Crane, St. Joseph Lead, N. Y. City, was re-elected president of the Lead Industries Association at its annual meeting, May 16, in the Waldorf-Astoria. F. H. Brownell, president, American Smelting & Refining, and F. W. Rockwell, president, National Lead, were both re-elected to vice-presidencies; F. E. Wormser was re-elected secretary-treasurer.

Merkin Heads N. Y. Group

New York Paint, Varnish, and Lacquer Association, at its annual meeting held in the Hotel Biltmore, N. Y. City, on May 11, elected the following officers: President, M. J. Merkin, of M. J. Merkin Paint Co.; vice-president, Thurlow J. Campbell, Valentine & Co.; secretary, Louis Gillespie, Gillespie-Rogers-Pyatt Co.; treasurer, Henrik E. Hendrickson, S. Winterbourne & Co.

Ellis-Foster Wins Suit

Ellis-Foster Co. won its suit against Gilbert Spruance Co., in an action over the Weber lacquer patent before U. S. Dist. Court, Eastern Dist. of Penna. The court has found valid claim 11 of the patent, as reissued in U. S. R. 19,967 ('36), and held that said patent was infringed by the defendant.

Parsons In New Quarters

M. W. Parsons, Imports & Plymouth Organic Laboratories, Inc., N. Y. City, has moved its offices to 59 Beekman st.; shipping and receiving departments are at 89 Ann st. Company has specialized for 30 years in white mineral oils, stearates, and related materials.

Reichhold Announcements

Reichhold Chemicals announces that Van Waters & Rogers, Inc., is now Pacific northwest sales agent for its line of synthetic resins.

W. H. Hasse has joined the Fred L. Lavanburg Co., and will cover the trade in Michigan, northern Indiana and northwestern Ohio.

N. J. Zinc Promotes Bennett

New Jersey Zinc has appointed M. T. Bennett, for the past 13 years in the Chicago territory, assistant manager of the pigment division in N. Y. City.

Personals

Col. James J. Riley is now residing at his estate "Tally-Ho Farm," Keswick, Ga.

Dr. L. W. Bass, assistant director, Mellon Institute, was the speaker at the dinner and final meeting of the season of the Erie (Pa.) section, A. C. S., on May 8, held at Villa Maria College, Erie.

W. B. Wiegand, director of research, Columbian Carbon, N. Y. City, is a member of the Goodyear Centennial Committee in charge of arrangements for the celebration to be held in Boston, Sept. 13, 15.

Thomas D. Jolly, director of purchases, Aluminum Co. of America, was elected president of the National Association of Purchasing Agents at its annual convention in San Francisco, May 22-25.

Fred Scholler, Scholler Bros., Philadelphia, won the golf cup at the Sulphonated Oil Manufacturers' annual outing, May 24-25, at Seaview Golf Club, Absecon, N. J. About 35 participated.

Donald D. Bradley, president, Rolls Chemical, Buffalo, was elected president of the Buffalo Foreign Trade Association at a meeting of the Board of Directors held in the Buffalo Chamber of Commerce May 26th.

Arthur Phillips, president, National Oil & Supply, and Mrs. Phillips were hosts to Dr. Pedro Palma, president of the Cuban delegation to the World's Fair.

Prices Current

Heavy Chemicals, Coal-tar Products, Dye-and-Tanstuffs, Colors and Pigments, Fillers and Sizes, Fertilizer and Insecticide Materials, Petroleum Solvents and Chemicals, Naval Stores, Fats and Oils, etc.

Chemical prices quoted are of American manufacturers for spot New York, immediate shipment, unless otherwise specified. Products sold f. o. b. works are specified as such. Import chemicals are so designated. Resale stocks when a market factor are quoted in addition to maker's prices and indicated "second hands."

Oils are quoted spot New York, ex-dock. Quotations f. o. b. mills, or for spot goods at the Pacific Coast are so designated.

Raw materials are quoted New York, f. o. b., or ex-dock. Materials sold f. o. b. works or delivered are so designated.

The current range is not "bid and asked," but are prices from different sellers, based on varying grades or quantities or both. Containers named are the original packages most commonly used.

Purchasing Power of the Dollar: 1926 Average—$1.00 - 1937 Average $1.10 - Jan. 1939 $1.25 - May 1939 $1.25

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Acetaldehyde, drs. c-l, wks lb	...	.10	.10	.14	...	.14
Acetaldol, 95%, 50 gal drs wks ... lb.	.21	.25	.21	.25	.21	.25
Acetamide, tech, lcl, kgs lb.	.28	.50	.28	.50	.32	.60
Acetanilid, tech, 150 lb bbls lb.	...	.22	.22	.29	.29	.32
Acetic Anhydride, drs, f.o.b. wks, frt all'd ... lb.	.10½	.11	.10½	.11	.10½	.11
Acetin, tech, drs. ... lb.	...	.33	...	.33	...	.33
Acetone, tks, f.o.b. wks, frt all'd ... lb.	...	.04¼	.04¼	.04¾	...	.04¾
drs, c-l, f.o.b. wks, frt all'd lb.	...	.05¾	...	.05¾	...	.05¾
Acetyl chloride, 100 lb cbys lb.	.55	.68	.55	.68	.55	.68
ACIDS						
Abietic, kgs, bbls ... lb.	.08¾	.09	.08¾	.09	.08¾	.10
Acetic, 28%, 400 lb bbls, c-l, wks ... 100 lbs.	...	2.23	...	2.23	...	2.23
glacial, bbls, c-l, wks 100 lbs.	...	7.62	...	7.62	...	7.62
glacial, USP, bbls, c-l, wks. ... 100 lbs.	...	10.25	...	10.25	...	10.25
Acetylsalicylic, USP, 225 lb bbls ... lb.	...	.50	...	.50	.50	.60
Adipic, kgs, bbls ... lb.	...	.72	...	.72	...	.72
Anthranilic, ref'd, bbls ... lb.	1.15	1.20	1.15	1.20	1.15	1.20
tech, bbls ... lb.	...	.75	...	.75	...	.75
Ascorbic, bot ... oz.	2.75	3.00	2.75	3.25	...	...
Battery, cbys, wks ... 100 lbs.	1.60	2.55	1.60	2.55	1.60	2.55
Benzoic tech, 100 lb kgs lb.	.43	.47	.43	.47	.43	.47
USP, 100 lb kgs ... lb.	.54	.59	.54	.59	.54	.59
Boric, tech, gran, 80 tons, bgs, delv ... ton *a*	...	96.00	...	96.00	95.00	96.00
Broenner's, bbls ... lb.	...	1.11	...	1.11	...	1.11
Butyric, edible, c-l, wks, cbys lb.	1.20	1.30	1.20	1.30	1.20	1.30
synthetic, c-l, drs, wks ... lb.	...	.22	...	.22	...	.22
wks, lcl ... lb.	...	.23	...	.23	...	.23
tks, wks ... lb.	...	.21	...	.21	...	.21
Camphoric, drs ... lb.	5.50	5.70	5.50	5.70	5.50	5.70
Caproic, normal, drs. ... lb.	...	.35	...	.35	...	...
Chicago, bbls ... lb.	...	2.10	...	2.10	...	2.10
Chlorosulfonic, 1500 lb drs, wks ... lb.	.03½	.05	.03½	.05	.03½	.05
Chromic, 99¾%, drs, delv lb.	.15¼	.17¼	.15¼	.17¼	.15¼	.17¼
Citric, USP, crys, 230 lb bbls. ... lb. *b*	.20	.21½	.20	.22½	.22	.25
anhyd, gran, bbls ... lb. *b*	...	.23	.23	.25	.25½	.26½
Cleve's, 250 lb bbls ... lb.	...	.57	...	.57	.50	.57
Cresylic, 99%, straw, HB, drs, wks, frt equal ... gal.	.63	.64	.63	.64	.63	.91
99%, straw, LB, drs, wks, frt equal ... gal.	.69	.71	.69	.71	.69	.94
resin grade, drs, wks, frt equal ... lb.	.09	.09½	.09	.09½	.09	.11¼
Crotonic, bbls, delv ... lb.	.21	.50	.21	.50	.21	1.00
Formic, tech, 140 lb drs ... lb.	.10½	.11½	.10½	.11½	.10½	.11½
Fumaric, bbls ... lb.	...	.75	...	.75	.60	.75
Fuming, see Sulfuric (Oleum)						
Gallic, tech, bbls ... lb.	.70	.73	.70	.73	.70	.79
USP, bbls ... lb.	.77	.81	.77	.81	.77	.91
Gamma, 225 lb bbls, wks ... lb.	...	.85	...	.85	...	.85
H, 225 lb bbls, wks ... lb.	.50	.55	.50	.55	.50	.55
Hydriodic, USP, 47% ... lb.	...	2.30	...	2.30	2.20	2.30
Hydrobromic, 34% conct 155 lb cbys, wks ... lb.	.42	.44	.42	.44	.42	.44
Hydrochloric, see muriatic						
Hydrocyanic, cyl, wks ... lb.	.80	1.30	.80	1.30	.80	1.30
Hydrofluoric, 30%, 400 lb bbls, wks ... lb.	.07	.07½	.07	.07½	.07	.07½
Hydrofluosilicic, 35%, 400 bbls, wks ... lb.	.09	.09½	.09	.09½	.09	.15
Lactic, 22%, dark, 500 lb bbls lb.	.02½	.02¾	.02½	.02¾	.02½	.02¾
22%, light ref'd, bbls ... lb.	.03½	.03¾	.03½	.03¾	.03½	.03¾
44%, light, 500 lb bbls ... lb.	.05½	.05¾	.05½	.05¾	.05½	.05¾
44%, dark, 500 lb bbls ... lb.	.06½	.06¾	.06½	.06¾	.06½	.06¾
50%, water white, 500 lb bbls ... lb.	.10½	.11½	.10½	.11½	.10½	.11½
USP X, 85%, cbys ... lb.	.42	.45	.42	.45	.42	.45
Lauric, drs. ... lb.	11¾	.12¼	.11¾	.12¼	.08½	.12¼
Laurent's, 250 lb bbls ... lb.	.45	.46	.45	.46	.45	.46
Levulinic, 5 lb bot wks ... lb.	...	2.00	...	2.00	...	2.00
Linoleic, bbls ... lb.	...	.20	...	.20	...	.20
Maleic, powd, kgs ... lb.	.30	.40	.30	.40	.30	.40
Malic, powd, kgs ... lb.	.45	.60	.45	.60	.45	.60
Metanillic, 250 lb bbls ... lb.	.60	.65	.60	.65	.60	.65
Mixed, tks, wks ... N unit	.06½	.07¼	.06½	.07¼	.06½	.07¼
S unit	.008	.009	.008	.009	.008	.009
Monochloracetic, tech, bbls lb.	.16	.18	.16	.18	.16	.18
Monosulfonic, bbls ... lb.	1.50	1.60	1.50	1.60	1.50	1.60
Muriatic, 18°, 120 lb cbys, c-l, wks ... 100 lb.	...	1.50	...	1.50	...	1.50
tks, wks ... 100 lb.	...	1.00	...	1.00	...	1.00
20°, cbys, c-l, wks ... 100 lb.	...	1.75	...	1.75	...	1.75
tks, wks ... 100 lb.	...	1.10	...	1.10	...	1.10
22°, c-l, cbys, wks ... 100 lb.	...	2.25	...	2.25	...	2.25
tks, wks ... 100 lb.	...	1.60	...	1.60	...	1.60
CP, cbys ... lb.	.06½	.07⅛	.06½	.07⅛	.06½	.07⅛
N & W, 250 lb bbls ... lb.	.85	.87	.85	.87	.85	.87
Naphthenic, 240-280 s.v., drs lb.	.10	.13	.10	.13	.10	.13
Sludges, drs ... lb.	...	.05	...	.05	...	.05
Naphthionic, tech, 250 lb bbls lb.	.60	.65	.60	.65	.60	.65
Nitric, 36°, 135 lb cbys, c-l, wks ... 100 lb. *c*	...	5.00	...	5.00	...	5.00
38°, c-l, cbys, wks 100 lb. *c*	...	5.50	...	5.50	...	5.50
40°, cbys, c-l, wks 100 lb. *c*	...	6.00	...	6.00	...	6.00
42°, c-l, cbys, wks 100 lb. *c*	...	6.50	...	6.50	...	6.50
CP, cbys, delv ... lb.	.11½	.12½	.11½	.12½	.11½	.12½
Oxalic, 300 lb bbls, wks, or N Y ... lb.	.10¾	.12	.10¾	.12	.10¾	.12
Phosphoric, 85%, USP, cbys lb.	.12	.14	.12	.14	.12	.14
50%, acid, c-l, drs, wks ... lb.	.06	.08	.06	.08	.06	.08
75%, acid, c-l, drs, wks ... lb.	...	.07½	...	.07½	.07½	.10½
Picramic, 300 lb bbls, wks lb.	.65	.70	.65	.70	.65	.70
Picric, kgs, wks ... lb.	.35	.40	.35	.40	.35	.40
Propionic, 98% wks, drs ... lb.	...	.22	...	.22	...	.22
80% ... lb.	.16	.17½	.16	.17½	.16	.17½
Pyrogallic, tech, lump, pwd, bbls ... lb.	...	1.05	...	1.05	...	1.05
cryst, USP ... lb.	1.45	1.63	1.45	1.63	1.45	1.63
Ricinoleic, bbls ... lb.	...	.35	...	.35	.35	.38
tech, bbls ... lb.	...	.13	...	.13	...	.13
Salicylic, tech, 125 lb bbls, wks ... lb.	...	.33	...	.33	...	.33
USP, bbls ... lb.	.35	.40	.35	.40	35	.45
Sebacic, tech, drs, wks ... lb.	...	nom.	...	nom.	.37	.41
Succinic, bbls ... lb.	...	.75	...	.75	...	.75
Sulfanilic, 250 lb bbls, wks lb.	.17	.18	.17	.18	.17	.18
Sulfuric, 60°, tks, wks ... ton	...	13.00	...	13.00	...	13.00
c-l, cbys, wks ... 100 lb.	...	1.25	...	1.25	...	1.25
66°, tks, wks ... ton	...	16.50	...	16.50	...	16.50
c-l, cbys, wks ... 100 lb.	...	1.50	...	1.50	...	1.50
CP, cbys, wks ... lb.	.06½	.07½	.06½	.07½	.06½	.07½
Fuming (Oleum) 20% tks, wks ... ton	...	18.50	...	18.50	...	18.50
Tannic, tech, 300 lb bbls ... lb.	.40	.47	.40	.47	.40	.47
Tartaric, USP, gran, powd, 300 lb bbls ... lb.	.27¼	.27¾	.27¼	.27¾	.24¼	.27¾
Tobias, 250 lb bbls ... lb.	.65	.67	.65	.67	.65	.67
Trichloroacetic bottles ... lb.	2.00	2.50	2.00	2.50	2.00	2.50
kgs ... lb.	...	1.75	...	1.75	...	1.75
Tungstic, tech, bbls ... lb.	1.70	1.80	1.70	1.80	1.65	2.00
Vanadic, drs, wks ... lb.	1.10	1.20	1.10	1.20	1.10	1.20
Albumen, light flake, 225 lb. bbls ... lb.	.52	.60	.52	.60	.52	.60
dark, bbls ... lb.	.13	.18	.13	.18	.11	.18
egg, edible ... lb.	.62	.73	.65	.78	.77	1.15
vegetable, edible ... lb.	.74	.78	.74	.78	.74	.78
ALCOHOLS						
Alcohol, Amyl (from Pentane) tks, delv ... lb.	...	.101	...	.101	.101	.106
c-l, drs, delv ... lb.	...	.111	...	.111	.111	.116
lcl, drs, delv ... lb.	...	.121	...	.121	.121	.126
Amyl, secondary, tks, delv lb.	...	.08½	...	.08½	...	.08½
drs, c-l, delv E, of Rockies ... lb.	...	.09½	...	.09½	...	.09½
Benzyl, cans ... lb.	.68	1.00	.68	1.00	.68	1.00
Butyl, normal, tks, f.o.b. wks, frt all'd ... lb. *d*	...	.07½	.07½	.08½	.08½	.09
c-l, drs, f.o.b. wks, frt all'd ... lb. *d*	...	.08½	.08½	.09½	.09½	.10
Butyl, secondary, tks, delv ... lb. *d*	...	.06	...	.06	...	.06
c-l, drs, delv ... lb. *d*	...	.07	...	.07	...	.07
Capryl, drs, tech, wks ... lb.	...	.85	...	.85	...	.85
Cinnamic, bottles ... lb.	2.00	2.50	2.00	2.50	2.00	2.50
Denatured, CD, 14, 13, c-l, drs, wks ... gal. *e*	...	.29½	.29½	.32	.31	.35
tks, East, wks ... gal.	...	.21½	.21½	.24	.23	.29
Western schedule, c-l, drs, wks ... gal. *e*	...	.34½	.34½	.37	.36	.38
Denatured, SD, No. 1, tks,	...	.19½	.19½	.22	.22	.27
c-l, drs, wks ... gal. *e*	...	.25½	.25½	.28	.28	.33

a Powdered boric acid $5 a ton higher in each case; USP $15 higher; *b* Powdered citric is ½c higher; kegs are in each case ½c higher than bbls.; *y* Price given is per gal.

c Yellow grades 25c per 100 lbs. less in each case; *d* Spot prices are 1c higher; *e* Anhydrous is 5c higher in each case; *f* Pure prices are 1c higher in each case.

ABBREVIATIONS—Anhydrous, anhyd; bags, bgs; barrels, bbls; carboys, cbys; carlots, c-l; less-than-carlots, lcl; drums, drs; kegs, kgs; powdered, powd; refined, ref'd; tanks, tks; works, f.o.b., wks.

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Alcohols (continued):						
Diacetone, pure, c-l, drs, delv lb. *f*	...	.09	.09	.11½	...	.11½
tech, contract, drs, c-l, delv lb.	...	.08½	.08½	.10½	...	.10½
Ethyl, 190 proof, molasses, tks gal. *g*	...	4.46	4.46	4.48½	4.04	4.51½
c-l, drs gal. *g*	..	4.49	4.49	4.54½	4.10	4.59½
c-l, bbls gal. *g*		4.53	4.53	4.55½	4.11	4.58½
Furfuryl, tech, 500 lb drs lb.	.25	.35	.25	.35	.25	.35
Hexyl, secondary tks, delv lb.	...	.12	...	.12	...	.12
c-l, drs, delv lb.	...	.13	...	.13	...	.13
Normal, drs, wks lb.	3.25	3.50	3.25	3.50	3.25	3.50
Isoamyl, prim, cans, wks lb.	...	.32	...	.32	...	.32
drs, lcl, delv lb.	...	.27	...	.27	...	.27
Isobutyl, ref'd, lcl, drs lb.	...	.09	...	.09	.09	.10
c-l, drs lb.	...	.08½	...	.08½	.08½	.09½
tks lb.	..	.07½	...	.07½	.07½	.08½
Isopropyl, ref'd, 91%, c-l, drs, f.o.b. wks, frt all'd lb.	...	.36	...	.36	...	.36
Ref'd 98%, drs, f.o.b. wks, frt all'd gal.	...	.41	...	.41	...	.41
Tech 91%, drs, above terms gal.	...	.33½	...	.33½	...	.33½
tks, same terms gal.	...	.28½	...	.28½	...	.28½
Tech 98%, drs, above terms gal.	...	.37½	...	.37½	...	.37½
tks, above terms gal.	...	.32½	...	.32½	...	.32½
Spec Solvent, tks, wks gal.	..	.20½	.20½	.23	.23	.28
Aldehyde ammonia, 100 gal drs lb.	.80	.82	.80	.82	.80	.82
Aldehyde Bisulfite, bbls, delv lb.	...	.17	...	.17	...	.17
Aldol, 95%, 55 and 110 gal, drs, delv lb.	.11	.12	.11	.20	...	.20
Alphanaphthol, crude, 300 lb bbls lb.	...	.52	...	.52	...	.52
Alphanaphthylamine, 350 lb bbls lb.	.32	.34	.32	.34	.32	.34
Alum, ammonia, lump, c-l, bbls, wks 100 lb.	3.40	3.65	3.40	3.65	3.40	3.65
delv NY, Phila 100 lb.	...	3.40	...	3.40	...	3.40
Granular, c-l, bbls wks 100 lb.	3.15	3.40	3.15	3.40	3.15	3.40
Powd, c-l, bbls, wks 100 lb.	...	3.55	...	3.55	...	3.55
Chrome, bbls 100 lb.	6.50	6.75	6.50	6.75	6.50	6.75
Potash, lump, c-l, bbls, wks 100 lb.	3.65	3.90	3.65	3.90	3.65	3.90
Granular, c-l, bbls, wks 100 lb.	3.40	3.65	3.40	3.65	3.40	3.65
Powd, c-l, bbls, wks 100 lb.	3.80	4.05	3.80	4.05	3.80	4.05
Soda, bbls, wks 100 lb.	...	3.25	...	3.25	...	3.25
Aluminum metal, c-l, NY 100 lb.	...	20.00	...	20.00	...	20.00
Acetate, 20%, bbls lb.	.07½	.09	.07½	.09	.07½	.10
Basic powd, bbls, delv. lb.	.40	.50	.40	.50	.40	.50
Chloride anhyd, 99%, wks lb.	.07	.12	.07	.12	.07	.12
93%, wks lb.	.05	.08	.05	.08	.05	.08
Crystals, c-l, drs, wks lb.	.06	.06¼	.06	.06¼	.06	.06¼
Solution, drs, wks lb.	.02¾	.03¼	.02¾	.03¼	.02¾	.03¼
Formate, 30% sol bbls, c-l, delv lb.	...	.13	...	.13	...	.13
Hydrate, 96%, light, 90 lb bbls, delv lb.	.12	.13	.12	.13	.12	.13
heavy, bbls, wks lb.	.029	.03½	.029	.03½	.029	.03½
Oleate, drs lb.	.16¾	.18½	.16¾	.18½	.16¾	.18½
Palmitate, bbls lb.	...	.23	...	.23	...	.23
Resinate, pp., bbls lb.	...	.15	...	.15	...	.15
Stearate, 100 lb. bbls lb.	.16	.17	.16	.21	.19	.21
Sulfate, com, c-l, bgs, wks 100 lb.	...	1.15	...	1.15	1.15	1.35
c-l, bbls, wks 100 lb.	...	1.35	...	1.35	1.35	1.55
Sulfate, iron-free, c-l, bgs, wks, 100 lb.	...	2.00	...	2.00	...	2.00
c-l, bbls, wks 100 lb.	...	2.20	...	2.20	...	2.20
Aminoazobenzene, 110 lb kgs lb.	...	1.15	...	1.15	...	1.15
Ammonia anhyd fert com, tks lb.	.04½	.05½	.04½	.05½	.04½	.05½
Ammonia anhyd, 100 lb cyl lb.	.16	.22	.16	.22	.16	.22
26°, 800 lb drs, delv lb.	.02¼	.02½	.02¼	.02½	.02¼	.02½
Aqua 26°, tks, NH cont.	...	.04z	...	.04z	...	.05**
tk wagon lb.	...	.02	...	.02	...	.02
Ammonium Acetate, kgs lb.	.26	.33	.26	.33	.26	.33
Bicarbonate, bbls, f.o.b. wks 100 lb.	5.15	5.71	5.15	5.71	5.15	5.71
Bifluoride, 300 lb bbls lb.	.14½	.16½	.14½	.16½	.14½	.17
carbonate, tech, 500 lb bbls lb.	.08	.12	.08	.12	.08	.12
Chloride, White, 100 lb bbls, wks 100 lb.	4.45	4.90	4.45	4.90	4.45	4.90
Gray, 250 lb bbls, wks 100 lb.	5.50	6.25	5.50	6.25	5.50	6.25
Lump, 500 lb cks spot lb.	.10½	.11	.10½	11.	.10½	.11
Lactate, 500 lb bbls lb.	.15	.16	.15	.16	.15	.16
Laurate, bbls lb.	...	.23	...	.23	...	.23
Linoleate, 80% anhyd, bbls lb.	...	.15	...	.15	...	.15
Naphthenate, bbls lb.	...	.17	...	.17	...	.17
Nitrate, tech, cks lb.	.036	.0385	.036	.0405	.038	.0405
Oleate, drs lb.	...	.15	...	.15	...	.15
Oxalate, neut, cryst, powd, bbls lb.	.19	.20	.19	.20	.19	.22½
Perchlorate, kgs lb.	...	.16	...	.16	...	.16
Persulfate, 112 lb kgs lb.	.21	.24	.21	.24	.21	.24
Phosphate, dibasic tech, powd, 325 lb bbls lb.	.07½	.10	.07½	.10	.07½	.10
Ricinoleate, bbls lb.	...	.15	...	.15	...	.15
Stearate, anhyd, bbls lb.	...	.23	.23	.24	...	.24
Paste, bbls lb.	...	.08	.07½	.08	...	.07½

g Grain alcohol 25c a gal. higher in each case. **On a delv. basis.
z On a f.o.b. wks. basis.

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Ammonium (continued):						
Sulfate, dom, f.o.b., bulk ton	...	28.00	...	28.00	26.50	28.50
Sulfocyanide, pure, kgs lb.	...	.55	...	.55	...	.55
Amyl Acetate (from pentane)						
tks, delv lb.	...	.095	.095	.10	.10	.11½
c-l, drs, delv lb.	...	.105	.105	.11	...	...
lcl, drs, delv lb.	...	.115	.115	.112	...	...
tech, drs, delv lb.	...	.11½	.10½	.11½	.11	.10½
Secondary, tks, delv. lb.	...	.08½	...	.08½	...	.08½
c-l, drs, delv lb.	...	.09½	...	.09½	...	.09½
tks, delv lb.	...	.08½	...	.08½	...	.08½
Chloride, norm, drs, wks lb.	.56	.68	.56	.68	.56	.68
mixed, drs, wks lb.	.0565	.0665	.0565	.077	.07	.077
tks, wks lb.	...	.0465	.0465	.06	...	.06
Mercaptan, drs, wks lb.	...	1.10	...	1.10	...	1.10
Oleate, lcl, wks, drs lb.	...	.25	...	.25	...	.25
Stearate, lcl, wks, drs lb.	...	.26	...	.26	...	.26
Amylene, drs, wks lb.	.102	.11	.102	.11	.102	.11
tks, wks lb.	..	.09	...	.09	...	.09
Aniline Oil, 960 lb drs and tks lb.	.14½	.17½	.14½	.17½	.14½	.17½
Annatto fine lb.	.34	.37	.34	.37	.34	.37
Anthracene, 80% lb.	...	.55	.55	.75	...	.75
Anthraquinone, sublimed, 125 lb bbls lb.	...	.65	...	.65	...	.65
Antimony metal slabs, ton lots lb.	...	.12	.11¼	.12	.10¾	.14
Butter of, see Chloride.						
Chloride, soln cbys lb.	...	.17	...	.17	...	.17
Needle, powd, bbls lb.	.12	.13	.12	.14	.12½	.16
Oxide, 500 lb bbls lb.	.11	.11¾	.11	.12½	.11½	.16½
Salt, 63% to 65%, tins lb.	.25¾	.27	.25¾	.27	.26	.27
Sulfuret, golden, bbls lb.	.22	.23	.22	.23	.22	.23
Archil, conc, 600 lb bbls lb.	.21	.27	.21	.27	.21	.27
Double, 600 lb bbls lb.	.18	.20	.18	.20	.18	.20
Aroclors, wks lb.	.18	.30	.18	.30	.18	.30
Arrowroot, bbls lb.	.08½	.09	.08½	.09	.08½	.09
Arsenic, Metal lb.	.40	.41	.40	.41	.40	.44
Red, 224 lb cs kgs lb.	...	.15¾	...	.15¾	...	.15¾
White, 112 lb kgs lb.	.03	.03¾	.03	.03¾	.03	.04
B						
Barium Carbonate precip, 200 lb bgs, wks ton	52.50	62.50	52.50	62.50	52.50	62.50
Nat (witherite) 90% gr, c-l, wks, bgs ton	41.00	43.00	41.00	43.00	41.00	44.00
Chlorate, 112 lb kgs, NY lb.	.16½	.17½	.16½	.17½	.16½	.17½
Chloride, 600 lb bbls, delv, zone 1 ton	77.00	92.00	77.00	92.00	77.00	.92.00
Dioxide, 88%, 690 lb drs lb.	.11	.12	.11	.12	.11	.12
Hydrate, 500 lb bbls lb.	.04¾	.05½	.04¾	.05½	.04¾	.05½
Nitrate, bbls lb.	.06¾	.07¼	.06¾	.07¼	.06¾	.08¼
Barytes, floated, 350 lb bbls c-l, wks ton	...	.23.65	...	23.65	...	23.65
Bauxite, bulk, mines ton	7.00	10.00	7.00	10.00	7.00	10.00
Bentonite, c-l, 325 mesh, bgs, wks ton	...	16.00	...	16.00	...	16.00
200 mesh ton	...	11.00	...	11.00	...	11.00
Benzaldehyde, tech, 945 lb. drs, wks lb.	.60	.62	.60	.62	.60	.62
Benzene (Benzol), 90%, Ind. 8000 gal tks, ft all'd gal.	...	.16	...	.16	...	.16
90% c-l, drs gal.	...	.21	...	.21	...	.21
Ind pure, tks, frt all'd gal.	...	.16	...	.16	...	.16
Benzidine Base, dry, 250 lb bbls lb.	.70	.72	.70	.72	.70	.72
Benzoyl Chloride, 500 lb drs lb.	.40	.45	.40	.45	.40	.45
Benzyl Chloride, 95-97% rfd, drs lb.	.30	.40	.30	.40	.30	.40
Tech, drs lb.	.25	.26	.25	.26	.25	.26
Beta-Naphthol, 250 lb bbls, wks lb.	.23	.24	.23	.24	.23	.24
Naphthylamine, sublimed, 200 lb bbls lb.	1.25	1.35	1.25	1.35	1.25	1.35
Tech, 200 lb bbls lb.	.51	.52	.51	.52	.51	.52
Bismuth metal lb.	1.10	1.15	1.05	1.15	1.00	1.10
Chloride, boxes lb.	3.20	3.25	3.20	3.25	3.20	3.25
Hydroxide, boxes lb	3.15	3.20	3.15	3.20	3.15	3.20
Oxychloride, boxes lb.	...	2.95	...	2.95	...	2.95
Subbenzoate, boxes lb.	3.25	3.30	3.25	3.30	3.25	3.30
Subcarbonate, kgs lb.	1.53	1.56	1.53	1.56	1.13	1.58
Trioxide, powd, boxes lb.	...	3.57	...	3.57	...	3.57
Subnitrate, fibre, drs lb.	1.33	1.36	1.33	1.36	1.03	1.48
Blanc Fixe, 400 lb bbls, wks ton *h*	40.00	75.00	40.00	75.00	40.00	75.00
Bleaching Powder, 800 lb drs, c-l, wks, contract 100 lb.	...	2.00	...	2.00	...	2.00
lcl, drs, wks lb.	2.25	3.60	2.25	3.60	2.25	3.60
Blood, dried, f.o.b., NY unit	...	2.75	2.75	3.50	2.50	3.25
Chicago, high grade unit	...	3.00	3.00	3.35	2.35	3.35
Imported shipt unit	.	2.75	2.75	3.00	2.90	3.45
Blues, Bronze Chinese Milori Prussian Soluble lb.	.36	.37	.36	.37	.36	.37
Ultramarine,* dry, wks, bbls lb.	...	.11	...	.11	...	.11
Regular grade, group 1 lb.	...	.16	...	.16	...	.16
Special, group 1 lb.	...	.19	...	.19	...	.19
Pulp, No. 1 lb.	...	.27	...	.27	...	.27
Bone, 4½ + 50% raw, Chicago ton	28.00	29.00	28.00	29.00	25.50	30.00
Bone Ash, 100 lb kgs lb.	.06	.07	.06	.07	.06	.07
Black, 200 lb bbls lb.	.06½	.08¼	.06½	.08¼	.06½	.08¼
Meal, 3% & 50%, imp ton	...	24.00	22.00	24.00	20.50	23.75
Domestic, bgs, Chicago ton	...	27.00	24.00	27.00	16.00	26.00
Borax, tech, gran, 80 ton lots, sacks, delv ton *i*	...	43.00	...	43.00	42.00	43.00
bbls, delv ton *i*	...	53.00	...	53.00	52.00	53.00

h Lowest price is for pulp, highest for high grade precipitated; *i* Crystals $6 per ton higher; USP, $15 higher in each case; *Freight is equalized in each case with nearest producing point.

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Borax (continued)						
Tech, powd, 80 ton lots, sacks ....ton *j*	...	47.00	...	47.00	...	47.00
bbls, del ....ton *j*	...	57.00	...	57.00	...	57.00
Bordeaux Mixture, drs ...lb.	.11	.11½	.11	.11½	.11	.11½
Bromine, cases ....lb.	.30	.43	.30	.43	.30	.43
Bronze, Al, pwd, 300 lb drs lb.	.90½	.92½	.90½	.92½	.90½	.92½
Gold, blk ....lb.	.45	.65	.45	.65	.45	.65
Butanes, com 16-32° group 3 tks ....lb.	.02¼	.03¾	.02¼	.03¾	.02¼	.03¾
Butyl, Acetate, norm drs, frt allowed ....lb.	...	.08½	.08½	.09½	.09½	.10½
tks, frt allowed .....lb.	...	.07½	.07½	.08½	.08½	.09
Secondary, tks, frt allowed ....lb.	...	.06	.06	.06½	.06½	.07
drs, frt allowed ....lb.	.07	.07½	.07	.08	.07½	.08½
Aldehyde, 50 gal drs, wks ....lb.	.15½	.17½	.15½	.17½	.16½	.17½
Carbinol, norm drs, wks lb.	.60	.75	.60	.75	.60	.75
Crotonate, norm, 55 and 110 gal drs, delv ....lb.	.75	1.00	.75	1.00	...	...
Lactate ....lb.	.22½	.23½	.22½	.23½	.22½	.23½
Oleate, drs. frt allowed lb.	...	.25	...	.25	...	.25
Propionate, drs ....lb.	.16½	.17	.16½	.18½	.18	.18½
tks, delv ....lb.	...	.15½	.15½	.17	...	.17
Stearate, 50 gal drs ...lb.	...	.26	...	.26	...	.26
Tartrate, drs ....lb.	.55	.60	.55	.60	.55	.60
Butyraldehyde, drs, lcl, wks lb.	...	.35½	...	.35½	...	.35½
C						
Cadmium Metal ....lb.	.	.55	.55	.85	.85	1.60
Sulfide, orange, boxes lb.	.75	.85	.75	.90	.80	1.60
Calcium, Acetate, 150 lb bgs c-l, delv ....100 lb.	...	1.65	...	1.65	...	1.65
Arsenate, c-l, E. of Rockies, dealers, drs ....lb.	.06¾	.07¼	.06¾	.07¼	.06¾	.07¼
Carbide, drs ....lb.	.05	.06	.05	.06	.05	.06
Carbonate, tech, 100 lb bgs c-l ....lb.	...	1.00	...	1.00	...	1.00
Chloride, flake, 375 lb drs, burlap bgs, c-l, delv..ton	...	22.00	...	22.00	22.00	23.50
paper bgs, c-l, delv..ton	23.00	36.00	23.00	36.00	23.00	36.00
Solid, 650 lb drs, c-l, delv ....ton	...	20.00	...	20.00	20.00	21.50
Ferrocyanide, 350 lb bbls wks ....lb.	...	.17	...	.17	...	.17
Gluconate, Pharm, 125 lb bbls ....lb.	.50	.57	.50	.57	.50	.57
Levulinate, less than 25 bbl lots, wks ....lb.	...	3.00	...	3.00	...	3.00
Nitrate, 100 lb bgs ....ton	...	28.00	...	28.00	...	28.00
Palmitate, bbls ....lb.	.22	.23	.22	.23	.22	.23
Phosphate, tribasic, tech, 450 lb bbls ....lb.	.06½	.07½	.06½	.07½	.06½	.07½
Resinate, precip, bbls ..lb.	.13	.14	.13	.14	.13	.14
Stearate, 100 lb bbls ..lb.	.19	.21	.19	.21	.19	.21
Camphor, slabs ....lb.	.48½	.51	.48½	.52½	.52	.56
Powder ....lb.	.48½	.51	.48½	.52½	.52	.56
Carbon Bisulfide, 500 lb drs lb.	.05	.05¾	.05	.05¾	.05	.05¾
Black, c-l, bgs, delv, price varying with zone† ..lb.	.02¾	.03¾	.02¾	.03¾	.027	.0380
lcl, bgs, f.o.b. whse ..lb.	...	.06¼	...	.06¼	.05¾	.06¼
cartons, f.o.b. whse ..lb.	...	.06¼	...	.06¼	...	.06¼
cases, f.o.b. whse ......lb.	...	.07	...	.07	...	.07
Decolorizing, drs, c-l ...lb.	.08	.15	.08	.15	.08	.15
Dioxide, Liq 20-25 lb cyl lb.	.06	.08	.06	.08	.06	.08
Tetrachloride, 55 or 110 gal drs, c-l, delv ...lb.	.05	.05½	.05	.05½	.05	.06
Casein, Standard, Dom, grd lb.	.07¼	.10¼	.07	.11	.06½	.13½
80-100 mesh, c-l, bgs ..lb.	.07¾	.10¾	.07½	.11½	.07	.14
Castor Pomace, 5½ NH_3, c-l, bgs, wks ....ton	...	16.50	16.50	18.50	18.50	21.00
Imported, ship, bgs ....ton	...	19.00	19.00	20.00	20.00	21.00
Celluloid, Scraps, ivory cs lb.	.12	.15	.12	.15	.12	.15
Transparent, cs ....lb.	...	.20	...	.20	...	.20
Cellulose, Acetate, 50 lb kgs ....lb.	...	.36	...	.36	.36	.40
Chalk, dropped, 175 lb bbls lb.	.02¾	.03¾	.02¾	.03¾	.02¾	.03¾
Precip, heavy, 560 lb cks lb.	.02¾	.03¼	.02¾	.03¼	.02¼	.04
Light, 250 lb cks ......lb.	.03¼	.04	.03¼	.04	.03¼	.04
Charcoal, Hardwood, lump, blk, wks ....bu.	...	.15	...	.15	...	.15
Softwood, bgs, delv* ..ton	23.00	34.00	23.00	34.00	23.00	34.00
Willow, powd, 100 lb bbls, wks ....lb.	.06	.07	.06	.07	.06	.07
Chestnut, clarified, tks, wks lb.	...	.01⅝	...	.01⅝	.01⅝	.02125
25%, bbls, wks ....lb.	...	.02	...	.02	.02	.0225
Pwd, 60%, 100 lb bgs, wks ....lb.	...	.04½	...	.04½	.04½	.04⅞
China Clay, c-l, blk mines ton	...	7.00	...	7.00	...	7.00
Imported, lump, blk ...ton	22.00	25.00	22.00	25.00	22.00	25.00
Chlorine, cyls, lcl, wks, contract ....lb.	.07½	.08½	.07½	.08½	.07½	.08½
cyls, c-l, contract ...lb. *j*	...	.05¼	.05¼	.05½	...	.05½
Liq, tk, wks, contract 100 lb.	...	1.75	1.75	2.00	2.00	2.15
Multi, c-l, cyls, wks, cont ....lb.	...	1.90	1.90	2.15	2.30	2.55
Chloroacetophenone, tins, wks ....lb.	3.00	3.50	3.00	3.50	3.00	3.50
Chlorobenzene, Mono, 100 lb drs, lcl, wks ....lb.	.06	.07½	.06	.07½	.06	.07½
Chloroform, tech, 1000 lb drs ....lb.	.20	.21	.20	.21	.20	.21
USP, 25 lb tins ......lb.	.30	.31	.30	.31	.30	.31
Chloropicrin, comml cyls ..lb.	...	.80	...	.80	...	.80
Chrome, Green, CP .....lb.	.21	.25	.21	.25	.21	.25
Yellow ....lb.	.14½	.15½	.14½	.15½	.14½	.15½

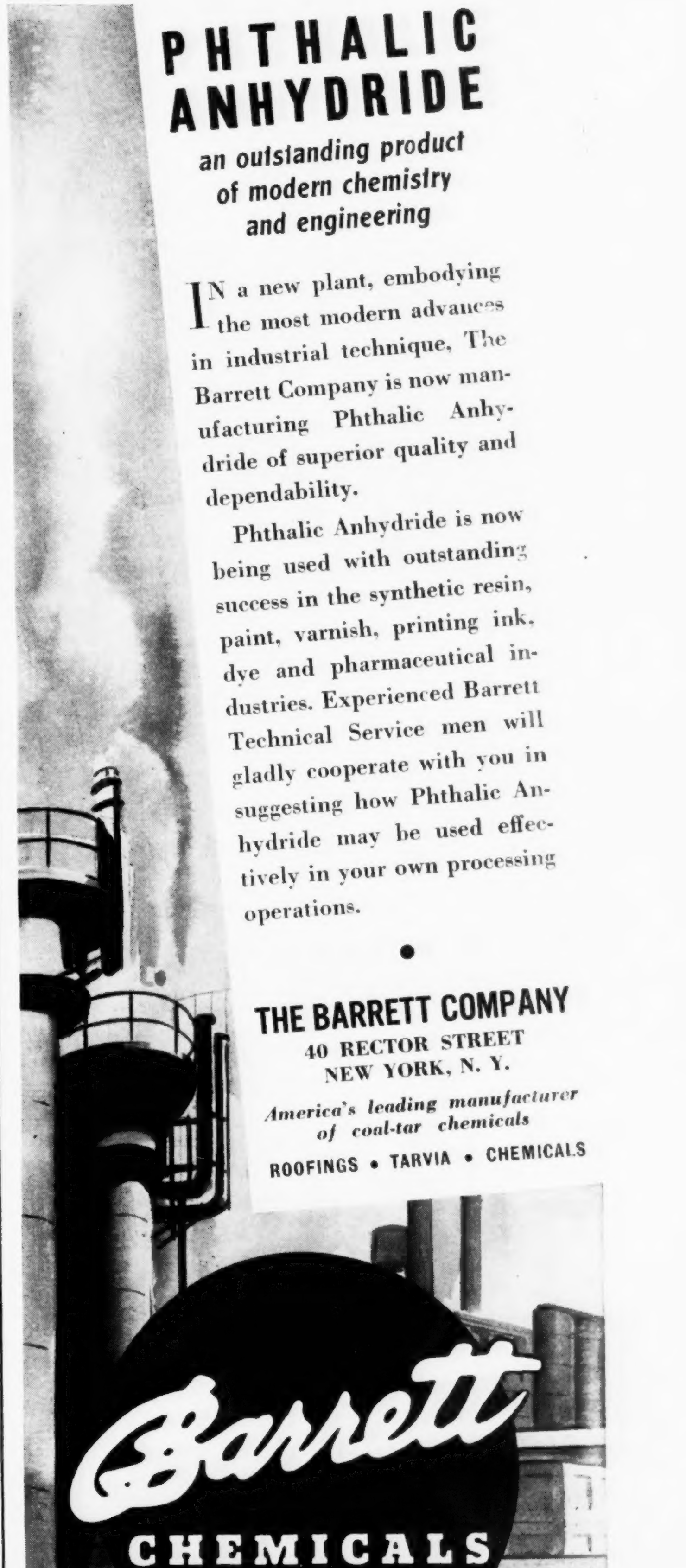
j A delivered price; * Depends upon point of delivery; † New bulk price, tank cars ¼c per lb. less than bags in each zone.

Current

Chromium Acetate
Dinitrobenzene

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Chromium Acetate, 8% Chrome, bbls ....lb.	.05	.08	.05	.08	.05	.08
Fluoride, powd, 400 lb bbl ....lb.	.27	.28	.27	.28	.27	.28
Coal tar, bbls ....bbl.	7.50	8.00	7.50	8.00	7.50	8.00
Cobalt Acetate, bbls .....lb.	.65	.67	.65	.67	.65	.68
Carbonate tech, bbls ...lb.	...	1.63	...	1.63	...	1.63
Hydrate, bbls ....lb.	...	1.78	...	1.78	1.36	1.78
Linoleate, solid, bbls...lb.	...	.33	...	.33	...	.33
paste, 6%, drs ......lb.	...	.31	...	.31	...	.31
Oxide, black, bgs ......lb.	...	1.67	...	1.67	...	1.67
Resinate, fused, bbls...lb.	...	.13½	...	.13½	...	.13½
Precipitated, bbls ....lb.	...	.34	...	.34	...	.34
Cochineal, gray or bk bgs lb.	.35	.38	.35	.38	.35	.38
Teneriffe silver, bgs ...lb.	.36	.39	.36	.39	.36	.39
Copper, metal, electrol 100 lb.	10.00	10.25	10.00	11.25	9.00	11.25
Acetate, normal, bbls, wks ....lb.	.21	.23	.21	.23	.21	.23
Carbonate, 400 lb bbls..lb.	.10½	.11½	.10½	.11½	.10¼	.11½
52-54% bbls ....lb.	.14½	.15½	.14½	.15½	.1340	.16¾
Chloride, 250 lb bbls...lb.	.13	.14	.13	.14	.12½	.17
Cyanide, 100 lb drs ...lb.	...	.34	...	.34	.34	.38
Oleate, precip, bbls ....lb.	.	.20	.	.20		.20
Oxide, black, bbls, wks lb.	.15	.16	.15	.17¾	.13½	.17¾
red 100 lb bbls ......lb.	.15¾	.16¾	.15¾	.17¾	.15	.19775
Sub-acetate verdigris, 400 lb bbls ....lb.	.18	.19	.18	.19	.18	.19
Sulfate, bbls, c-l, wks 100 lb.	...	4.10	4.10	4.50	4.00	4.50
Copperas, crys and sugar bulk c-l, wks ....ton	...	14.00	...	14.00	12.00	14.00
Corn Sugar, tanners, bbls 100 lb.	3.04	3.14	2.99	3.19	2.95	3.30
Corn Syrup, 42°, bbls 100 lb.	...	3.07	3.02	3.12	2.89	3.16
43°, bbls ....100 lb.	...	3.12	3.07	3.17	2.94	3.21
Cotton, Soluble, wet, 100 lb bbls ....lb.	.40	.42	.40	.42	.40	.42
Cream Tartar, powd & gran 300 lb bbls ....lb.	.22¾	.23¼	.22¾	.23¼	.19¾	.23¼
Creosote, USP, 42 lb cbys lb.	.45	.47	.45	.47	.45	.47
Oil, Grade 1 tks .....gal.	.13½	.14	.13½	.14	.13½	.14
Grade 2 ....gal.	.122	.132	.122	.132	.122	.132
Cresol, USP, drs ....lb.	.10	.10½	.10	.10½	.10	.12½
Crotonaldehyde, 97%, 55 and 110 gal drs, wks ....lb.	.11	.12	.11	.22*	.22*	.30*
Cutch, Philippine, 100 lb bale lb.	.04¼	.04½	.04¼	.04½	.04	.06
Cyanamid, bgs c-l, frt allowed Ammonia ....unit	...	1.15	...	1.15	...	1.15
D						
Derris root 5% rotenone, bbls ....lb.	.24	.30	.24	.30	.34	.43
Dextrin, corn, 140 lb bgs f.o.b., Chicago ...100 lb.	3.45	3.65	3.40	3.70	3.30	3.75
British Gum, bgs ...100 lb.	3.70	3.80	3.65	3.95	3.55	4.00
Potato, Yellow, 220 lb bgs lb.	.07	.07¾	.07	.08¾	.07¼	.08¾
White, 220 lb bgs, lcl lb.	.08	.09	.08	.09	.08	.09
Tapioca, 200 bgs, lcl ...lb.	...	.0715		.0715	.0715	.08
White, 140 lb bgs ..100 lb.	3.40	3.60	3.35	3.55	3.30	3.70
Diamylamine, c-l, drs, wks lb.	.47	.75	.47	.75	.47	.75
Diamylene, drs, wks .....lb.	.095	.102	.095	.102	.095	.102
tks, wks ....lb.	...	.08½	.	.08½	.	.08½
Diamylether, wks, drs ...lb.	.085	.092	.085	.092	.085	.092
tks, wks ....lb.	...	.075		.075		.075
Oxalate, lcl, drs, wks..lb.		.30		.30		.30
Diamylphthalate, drs, wks lb.	.21	.21½	.19	.21	.19	.21
Diamyl Sulfide, drs, wks lb.		1.10	...	1.10		1.10
Diatomaceous Earth, see Kieselguhr.						
Dibutoxy Ethyl Phthalate, drs, wks ....lb.	...	.35	...	.35	...	.35
Dibutylamine, lcl, drs, wks lb.	...	.55	...	.55	...	.55
Dibutyl Ether, drs, wks, lcl lb.	...	.25	...	.25	.25	.30
Dibutylphthalate, drs, wks, frt all'd ....lb.	.19	.19½	.19	.19½	.19	.21
Dibutyltartrate, 50 gal drs lb.	.45	.54	.45	.54	.45	.54
Dichlorethylene, drs .....lb.	...	.25	...	.25	...	.25
Dichloroethylether, 50 gal drs, wks ....lb.	.15	.16	.15	.16	.15	.16
tks, wks ....lb.	...	.14	...	.14	...	.14
Dichloromethane, drs, wks lb.	...	.23	...	.23	...	.23
Dichloropentanes, drs, wks lb.	no prices		no prices		...	...
tks, wks ....lb.	no prices		no prices		...	...
Diethanolamine, tks, wks..lb.	...	.23		.23		.23
Diethylamine, 400 lb drs..lb.	2.75	3.00	2.75	3.00	2.75	3.00
Diethylaniline, 850 lb drs lb.	.40	.52	.40	.52	.40	.50
Diethyl Carbinol, drs.....lb.	.60	.75	.60	.75	.60	.75
Diethylcarbonate, com drs lb.	.31¾	.35	.31¾	.35	.31¾	.35
Diethylorthotoluidin, drs ..lb.	.64	.67	.64	.67	.64	.67
Diethylphthalate, 1000 lb drs lb.	.19	.19½	.19	.19½	.19	.19½
Diethylsulfate, tech, drs, wks, lcl ....lb.	.13	.14	.13	.14	.13	.14
Diethyleneglycol, drs ....lb.	.16	.17	.16	.17	.16	.17
Mono ethyl ethers, drs. lb.	.15	.16	.15	.16	.15	.16
tks, wks ....lb.		.14	...	.14	...	.14
Mono butyl ether, drs. lb.	.23	.24	.23	.24	.23	.24
tks, wks ....lb.	...	.22	...	.22	...	.22
Diethylene oxide, 50 gal drs, wks ....lb.	.20	.24	.20	.24	.20	.24
Diglycol Oleate, bbls ....lb.	...	.13	.13	.20	...	.21
Laurate, bbls ....lb.	.16	.17	.16	.23	...	.27½
Stearate, bbls ....lb.	...	.24	.24	.28	...	.27½
Dimethylamine, 400 lb drs, pure 25 & 40% sol 100% basis ....lb.	...	1.00	...	1.00	...	1.00
Dimethylaniline, 340 lb drs lb.	.23	.24	.23	.24	.23	.27
Dimethyl Ethyl Carbinol, drs lb.	.60	.75	.60	.75	.60	.75
Dimethyl phthalate, drs, wks, frt allowed ....lb.	...	.19	...	.19	...	.19
Dimethylsulfate, 100 lb drs lb.	.45	.50	.45	.50	.45	.50
Dinitrobenzene, 400 lb bbls lb. *k*	.16	.19	.16	.19	.16	.19

k Higher price is for purified material; * These prices were on a delivered basis.



	Current Market		1939 Low	1939 High	1938 Low	1938 High
Dinitrochlorobenzene, 400 lb bbls ...lb.	.13½	.14	.13½	.14	.13½	.14
Dinitronaphthalene, 350 lb bbls ...lb.	.35	.38	.35	.38	.35	.38
Dinitrophenol, 350 lb bbls lb.	.23	.24	.23	.24	.23	.24
Dinitrotoluene, 300 lb bbls lb.	...	.15½	...	.15½	...	.15½
Diphenyl, bbls ...lb.	.15	.25	.15	.25	.15	.25
Diphenylamine ...lb.	.31	.32	.32	.32	.31	.32
Diphenylguanidine, 100 lb drs ...lb.	.31	.32	.31	.32	.31	.32
Dip Oil, see Tar Acid Oil.						
Divi Divi pods, bgs shipmt ton	...	nom.	...	nom.	...	nom.
Extract ...lb.	.05¾	.06¾	.05¾	.06¾	.05	.06¾
E						
Egg Yolk, dom., 200 lb cases lb.	.60	.63	.60	.69	.60	.69
Imported ...lb.	...	nom.	...	nom.	.62	.68
Epsom Salt, tech, 300 lb bbls c-l, NY ...100 lb.	1.90	2.10	1.90	2.10	1.90	2.10
USP, c-l, bbls ...100 lb.	...	2.10	...	2.10	...	2.10
Ether, USP anaesthesia 55 lb drs ...lb.	.22	.23	.22	.23	.22	.23
(Conc) ...lb.	.09	.10	.09	.10	.09	.10
Isopropyl 50 gal drs ...lb.	.07	.08	.07	.08	.07	.08
tks, frt allowed ...lb.	...	.06	...	.06	...	.06
Nitrous conc bottles ...lb.	...	.68	...	.68	...	.68
Synthetic, wks, drs ...lb.	.08	.09	.08	.09	.08	.09
Ethyl Acetate, 85% Ester tks, frt all'd ...lb.	...	.051	...	.051	.051	.05½
drs, frt all'd ...lb.	...	.061	...	.061	.061	.06½
99%, tks, frt all'd ...lb.	...	.0585	...	.0585	.0585	.06¾
drs, frt all'd ...lb.	...	.0685	...	.0685	.0685	.07¾
Acetoacetate, 110 gal drs lb.	...	.27½	...	.27½	...	.27½
Benzylaniline, 300 lb drs lb.	.86	.88	.86	.88	.86	.88
Bromide, tech, drs ...lb.	.50	.55	.50	.55	.50	.55
Cellullose, drs, wks, frt all'd ...lb.	.45	.50	.45	.50	.45	1.00
Chloride, 200 lb drs ...lb.	.22	.24	.22	.24	.22	.24
Chlorocarbonate, cbys ...lb.	...	.30	...	.30	...	.30
Crotonate, drs ...lb.	.75	1.00	.75	1.25	1.00	1.25
Formate, drs, frt all'd ...lb.	.27	.28	.27	.28	.27	.28
Lactate, drs, wks ...lb.	...	.33	...	.33	...	.33
Oxalate, drs, wks ...lb.	.30	.34	.30	.34	.30	.34
Oxybutyrate, 50 gal drs, wks ...lb.	.30	.30½	.30	.30½	.30	.30½
Silicate, drs, wks ...lb.	...	.77	...	.77	...	.77
Ethylene Dibromide, 60 lb drs ...lb.	.65	.70	.65	.70	.65	.70
Chlorhydrin, 40%, 10 gal cbys chloro, cont ...lb.	.75	.85	.75	.85	.75	.85
Anhydrous ...lb.	...	.75	...	.75	...	.75
Dichloride, 50 gal drs, wks lb.	.0545	.0994	.0545	.0994	.0545	.0994
Glycol, 50 gal drs, wks ...lb.	.17	.21	.17	.21	.17	.21
tks, wks ...lb.	...	.16	...	.16	...	.16
Mono Butyl Ether, drs, wks ...lb.	.20	.21	.20	.21	.20	.21
tks, wks ...lb.	...	.19	...	.19	...	.19
Mono Ethyl Ether, drs, wks ...lb.	.16	.17	.16	.17	.16	.17
tks, wks ...lb.	...	.15	...	.15	...	.15
Mono Ethyl Ether Acetate, drs, wks ...lb.	...	.14	...	.14	...	.14
tks, wks ...lb.	...	.13	...	.13	...	.13
Mono Methyl Ether, drs wks ...lb.	.18	.22	.18	.22	.18	.22
tks, wks ...lb.	...	.17	...	.17	...	.17
Oxide, cyl ...lb.	.50	.55	.50	.55	.50	.55
Ethylideneaniline ...lb.	.45	.47½	.45	.47½	.45	.47½
F						
Feldspar, blk pottery ...ton	17.00	19.00	17.00	19.00	17.00	19.00
Powd, blk, wks ...ton	14.00	14.50	14.00	14.50	14.00	14.50
Ferric Chloride, tech, crys, 475 lb bbls ...lb.	.05	.07½	.05	.07½	.05	.07½
sol, 42° cbys ...lb.	.06¼	.06½	.06¼	.06½	.06¼	.06½
Fish Scrap, dried, unground wks ...unit *l*	...	3.25	3.00	3.25	2.75	3.30
Acid, Bulk, 6 & 3%, delv Norfolk & Baltimore basis ...unit *m*	...	2.35	2.35	2.50	2.50	2.50
Fluorspar, 98% bgs ...lb.	...	30.00	30.00	33.00	...	33.00
Formaldehyde, USP, 400 lb bbls, wks ...lb.	.05¾	.06¼	.05¾	.06¼	.05¾	.06¼
Fossil Flour ...lb.	.02½	.04	.02½	.04	.02½	.04
Fullers Earth, blk, mines ton	10.00	11.00	10.00	11.00	10.00	11.00
Imp powd, c-l, bgs ...ton	23.00	30.00	23.00	30.00	23.00	30.00
Furfural (tech) drs, wks lb.	.10	.15	.10	.15	.10	.15
Furfuramide (tech) 100 lb. drs ...lb.	...	.30	...	.30	...	.30
Fusel Oil, 10% impurities lb.	.12½	.14	.12½	.14	.12½	.14
Fustic, crystals, 100 lb boxes ...lb.	.22	.26	.22	.26	.22	.26
Liquid 50°, 600 lb bbls lb.	.09½	.13	.09½	.13	.09½	.13
Solid, 50 lb boxes ...lb.	.17½	.19½	.17½	.19½	.17½	.19½
G						
G Salt paste, 360 lb bbls ...lb.	.45	.47	.45	.47	.45	.47
Gall Extract ...lb.		.22	.19	.22	.19	.20
Gambier, com 200 lb bgs lb.	.06¾	.07¾	.06¾	.07¾	.06¾	.07¾
Singapore cubes, 150 lb bgs ...100 lb.	.08½	.09½	.08¼	.09½	.08½	.11
Gelatine, tech, 100 lb cs lb.	.45	.50	.45	.50	.45	.50
Glauber's Salt, tech, c-l, bgs. wks* ...100 lb.	.95	1.15	.95	1.15	.95	1.15
Anhydrous, see Sodium Sulfate						

l + 10; *m* + 50; * Bbls. are 20c higher.

Current

		Current Market		1939 Low	1939 High	1938 Low	1938 High
Glue, bone, com grades, c-l bgs	lb.	.11½	.13½	.11½	.13½	.13	.16½
Better grades, c-l, bgs	lb.	.15	.16½	.15	.16½	.14½	.16½
Glycerin, CP, 550 lb drs	lb.	...	.12½	...	.12½	.12½	.16
Dynamite, 100 lb drs	lb.		.09	...	.09	.12¾	.16
Saponification, drs	lb.	.09	.10	.08½	.10	.08½	.11¼
Soap Lye, drs	lb.	.07¾	.07⅞	.07½	.07⅞	.07½	.10¼
Glyceryl Bori-Borate, bbls	lb.	...	.40	...	.40	...	.40
Monoricinoleate, bbls	lb.	...	.27	...	.27	...	.27
Monostearate, bbls	lb.	...	.30	...	.30	...	.30
Oleate, bbls	lb.	...	.22	...	.22	...	.22
Phthalate	lb.	...	.37	...	.37	...	.37
Glyceryl Stearate, bbls	lb.	...	.18		.18	...	.18
Glycol Bori-Borate, bbls	lb	...	.22	.22	.23	...	.26
Phthalate, drs	lb.	...	.38	.38	.40	...	.40
Stearate, drs	lb.	...	.24	.24	.27½	...	.27½
GUMS							
Gum Aloes, Barbadoes	lb	.85	.90	.85	.90	.85	.90
Arabic, amber sorts	lb.	.10½	.11	.09	.11	.09	.12
White sorts, No. 1, bgs	lb.	23	.24	.23	.24	.23	.28
No. 2, bgs	lb.	21	.22	.21	.22	.21	.26
Powd, bbls	lb.	.13	.14	.12½	.14	.12	.16
Asphaltum, Barbadoes (Manjak) 200 lb bgs, f.o.b., NY	lb.	.02½	.10½	.02½	.10½	.02½	.10½
California, f.o.b. NY, drs	ton	29.00	55.00	29.00	55.00	29.00	55.00
Egyptian, 200 lb cases, f.o.b. NY	lb.	.12	.15	.12	.15	.12	.15
Benzoin Sumatra, USP, 120 lb cases	lb.	.17	.18	.17	.21	.15	.25
Copal, Congo, 112 lb bgs, clean, opaque	lb.	...	.18¼	.18¼	.18¾	.18¾	.19¼
Dark amber	lb.	...	.07⅛	...	.07⅛	.07⅛	.08⅞
Light amber	lb.	...	.11¼	...	.11¼	.11¼	.13¼
Copal, East India, 180 lb bgs							
Macassar pale bold	lb.	...	.11⅜	...	.11⅜	.11⅜	.13
Chips	lb.	...	.05⅜	...	.05⅜	...	.05⅜
Dust	lb.	...	.03¾	.03¼	.04	.03½	.04⅛
Nubs	lb.	...	.09½	...	.09½	.09⅛	.10⅜
Singapore, Bold	lb.	...	.14	.14	.14½	.14½	.15¼
Chips	lb.	...	.05⅞	.05⅝	.06½	.04¾	.05⅜
Dust	lb.	...	.03¾	.03¼	.04	.03¼	.04⅛
Nubs	lb.	...	.09⅝	.09⅝	.10	.10	.10⅜
Copal Manila, 180-190 lb baskets, Loba A	lb.	...	.11	.10½	.11	.10½	.12
Loba B	lb.	...	.10¾	.09¾	.10¾	.10¼	.11⅝
Loba C	lb.	...	.10⅜	.09	.10⅜	.09¾	.11¼
DBB	lb.	...	.08¼	.07⅞	.08¼	.07⅞	.08¾
Dust	lb.	...	.05½	.05⅛	.05½	.05⅛	.06⅝
MA sorts	lb.	...	.06⅜	.05⅞	.06⅜	.05⅞	.07¼
Copal Pontianak, 224 lb cases, bold genuine	lb.	...	.15¼	...	.15¼	.15¼	.16½
Chips	lb.	...	.07⅛	.07⅛	.08¼	.08¼	.10¼
Mixed	lb.	...	.13⅜	.13⅜	.14	...	.14
Nubs	lb.	...	.10½	.10½	.11⅜	.11⅜	.12⅞
Split	lb.	...	.12	.12	.13½	.13½	.13⅞
Damar Batavia, 136 lb cases							
A	lb.	...	.20	...	.20	.20	.25½
B	lb.	...	.18½		.18½	.18½	.24
C	lb.	...	.14⅛	.14⅛	.14⅞	.14⅞	.20⅜
D	lb.	...	.12¼	.12¼	.13½	.13⅛	.17½
A/D	lb.	...	.13⅝	.13⅝	.14½	.14½	.20⅜
A/E	lb.		.11⅞	.11⅞	.12¼	.12¼	.17¼
E	lb.	...	.07⅜	...	.07⅜	.07⅜	.08½
F	lb.	...	.07¼	...	.07¼	...	.07¼
Singapore, No. 1	lb.	.	.13⅝	.13⅝	.15¼	.15¼	.21⅛
No. 2	lb.	...	.10⅞	.10⅞	.11¼	.10⅜	.15⅜
No. 3	lb.	...	.05⅜	.05¼	.05⅝	.05	.05¾
Chips	lb.	...	.09¼	.	.09¼	.09¼	.13½
Dust	lb.	...	.05⅝	.05¼	.05⅝	.05	.05¾
Seeds	lb.	...	.07⅜	...	.07⅜	.07⅜	.09½
Elemi, cns, c-l,	lb.	...	.08⅛	...	.08⅛	.08⅛	.09½
Ester	lb	.06	.07	.06	.07	.06¼	.08½
Gamboge, pipe, cases	lb.	.55	.60	.55	.60	.60	.80
Powd, bbls	lb.	.60	.65	.60	.65	.65	.85
Ghatti, sol, bgs	lb.	.11	.15	.11	.15	.11	.15
Karaya, bbls, bxs, drs,	lb.	.14	.23	.14	.23	...	...
Kauri, NY							
Brown XXX, cases	lb.	.60	.60½	.60	.60½	.60	.60½
BX	lb.	...	.38	...	.38	...	.38
B1	lb.	...	.28	...	.28	...	.28
B2	lb.	...	.24	...	.24	...	.24
B3	lb.	...	.18½	...	.18½	...	.18½
Pale XXX	lb.	...	.61	...	.61	...	.61
No. 1	lb.	...	.41	...	.41	...	.41
No. 2	lb.	...	.24	...	.24	...	.24
No. 3	lb.	...	.17¾	...	.17¾	...	.17¾
Kino, tins	lb.	3.50	nom.	2.50	3.50	2.00	2.75
Mastic	lb.	.55	.56	.55	.56	.55	.56
Sandarac, prime quality, 200 lb bgs & 300 lb cks	lb.	.15	.19	.15	.20	.19	.26
Senegal, picked bags	lb.	.25	.27	.25	.27	.23	.27
Sorts	lb.	.09¼	.09½	.09¼	.09½	.09¼	.12
Thus, bbls	280 lbs.	14.50	14.75	13.50	14.75	13.50	14.25
Tragacanth, No. 1, cases	lb.	2.25	2.35	2.25	2.45	2.40	3.00
No. 2	lb.	1.90	1.95	1.90	2.35	2.30	2.75
No. 3	lb.	1.60	1.65	1.60	1.95	1.90	2.70
Yacca, bgs	lb.	.03½	.04½	.03½	.04½	.03½	.04½
H							
Helium, cyl (200 cu. ft.)	cyl.	...	25.00	...	25.00	...	25.00
Hematine crystals, 400 lb bbls	lb.	.18	.34	.18	.34	.18	.34
Hemlock, 25%, 600 lb bbls.							
wks	lb.	.03	.03¼	.03	.03¼	.03	.03¼
tks	lb.	...	.02⅝	...	.02⅝	.02⅝	.02¾

	Current	Market	1939 Low	1939 High	1938 Low	1938 High
Hexalene, 50 gal drs, wks lb.	...	.30	...	.30	...	.30
Hexane, normal 60-70° C. Group 3, tks ......gal.	...	.10½	...	.10½	...	.10½
Hexamethylenetetramine, powd, drs ....lb.	.32	.33	.32	.36	.35	.36
Hexyl Acetate, secondary, delv, drs ....lb.	.13	.13½	.13	.13½	.13	.13½
tks ....lb.	...	.12	...	.12		.12
Hoof Meal, f.o.b. Chicago unit	...	2.65	2.65	2.85	2.35	3.35
Hydrogen Peroxide, 100 vol, 140 lb cbys ....lb.	.19½	.20	.19½	.20	.19½	.20
Hydroxylamine Hydrochloride ....lb.	...	3.15	...	3.15	...	3.15
Hypernic, 51°, 600 lb bbls lb.	.13	.16	.13	.21	.16	.21
I						
Indigo, Bengal, bbls .....lb.	...	2.40	...	2.40	...	2.40
Synthetic, liquid ......lb.	.16½	.19	.16½	.19	.16½	.19
Iodine, Resublimed, jars .lb.	...	1.75	...	1.75	1.50	1.75
Irish Moss, ord, bales ...lb.	.10	.11	.10	.11	.10	.11
Bleached, prime, bales lb.	.19	.20	.19	.20	.19	.20
Iron Acetate Liq. 17°, bbls delv ....lb.	.03	.04	.03	.04	.03	.04
Chloride see Ferric Chloride.						
Nitrate, coml, bbls...100 lb.	2.32	3.11	2.32	3.11	2.32	3.11
Isobutyl Carbinol(128-132° C) drs, wks ....lb.	.33	.34	.33	.34	.33	.34
tks, wks .... lb.	...	.32	...	.32	...	.32
Isopropyl Acetate, tks, frt all'd ....lb.	...	.0510	...	.0510	.0510	.05½
drs, frt all'd lb.	.061	.066	.061	.066	.061	.07
Ether, see Ether, isopropyl.						
Keiselguhr, dom bags, c-l, Pacific Coast ....ton	22.00	85.00	22.00	85.00	22.00	85.00
L						
Lead Acetate, f.o.b. NY, bbls, White, broken ......lb.	...	.10	...	.10	.10	.11
cryst, bbls ....lb.	...	.10	...	.10	.10	.11
gran, bbls ....lb.	...	.10¾	...	.10¾	.10¾	.11¾
powd, bbls ....lb.	...	.10¾	...	.10¾	.10¾	.11¾
Arsenate, East, drs ...lb.	.10	.10¼	,10	.11½	.11	.13½
Linoleate, solid, bbls...lb.		.19		.19		.19
Metal, c-l, NY .....100 lb.	4.75	4.80	4.75	5.10	4.00	5.10
Nitrate, 500 lb bbls, wks lb.	.10	.11½	.10	.11½	.10	.11½
Oleate, bbls ....lb.	.18½	.20	.18½	.20	.18½	.20
Red, dry, 95% Pb_3O_4, delv ....lb.	...	.0725	.07¼	.08	.06½	.08
97% Pb_3O_4, delv ...lb.	...	.075	.07½	.076	.06¾	.081
98% Pb_3O_4, delv ...lb.	...	.0775	.07¾	.0785	.07	.0835
Resinate, precip, bbls ..lb.	...	.16½	...	.16½	...	.16½
Stearate, bbls ....lb.	...	.25	.22	.25	.22	.23
Titanate, bbls, c-l, f.o.b. wks, frt all'd ....lb.	.11	.11½	.11	.11½	.11	.11½
White, 500 lb bbls, wks lb.	...	.07	...	.07	.06	.07
Basic sulfate, 500 lb bbls, wks ....lb.	...	.06¼	...	.06¼	.05¼	.06¼
Lime, chemical quicklime, f.o.b., wks, bulk ...ton	7.00	8.00	7.00	8.00	7.00	8.00
Hydrated, f.o.b. wks...ton	8.50	12.00	8.50	12.00	8.50	12.00
Lime Salts, see Calcium Salts						
Lime sulfur, dealers, tks..gal.	.08	.11½	.08	.11½	.08	.11½
drs ....gal.	.11	.16	.11	.16	.11	.16
Linseed Meal, bgs ......ton	...	38.00	38.00	42.00	39.00	45.00
Litharge, coml, delv, bbls.lb.	...	.0625	.06¼	.0635	.05½	.066
Lithopone, dom, ordinary, delv, bgs ....lb.	...	.04⅛	...	.04⅛	.04⅛	.04⅝
bbls ....lb.	...	.04⅜	...	.04⅜	.04⅜	.04⅞
High strength, bgs ....lb.	...	.05⅝	...	.05⅝	.05⅝	.06⅛
bbls ....lb.	...	.05⅞	...	.05⅞	.05⅞	.06⅜
Titanated, bgs ....lb.	...	.05⅝	...	.05⅝	.05⅝	.06⅛
bbls ....lb.	...	.05⅞	...	.05⅞	.05⅞	.06⅜
Logwood, 51°, 600 lb bbls lb.	.09½	.11½	.09½	.11½	.09½	.11½
Solid, 50 lb boxes .....lb.	.15	.19	.15	.19	.15	.19
Sticks ....ton	24.00	25.00	24.00	25.00	24.00	25.00
M						
Madder, Dutch ....lb.	.22	.25	.22	.25	.22	.25
Magnesite, calc, 500 lb bbls ton	60.00	65.00	60.00	65.00	60.00	65.00
Magnesium Carb, tech, 70 lb bgs, wks ....lb.	...	.06¼	.05¾	.06½	.05¾	.07
Chloride flake, 375 lb drs, c-l, wks ....ton	39.00	42.00	39.00	42.00	39.00	42.00
Fluosilicate, crys, 400 lb bbls, wks ....lb.	.10	.10½	.10	.10½	.10	.10½
Oxide, calc tech, heavy bbls, frt all'd .....lb.	.25	.30	.25	.30	.25½	.30½
Light, bbls above basis lb.	.20	.25	.20	.25	.20	.25½
USP Heavy, bbls, above basis ....lb.	.25	.30	.25	.30	.25	.30½
Palmitate, bbls ....lb.	.33	nom.	.33	nom.	...	.33
Silicofluoride, bbls ...lb.	.09½	.10½	.09½	.10½	.09½	.10½
Stearate, bbls ....lb.	.21	.24	.21	.24	.21	.24
Manganese acetate, drs...lb.	...	.26½	...	.26½	...	.26½
Borate, 30%, 200 lb bbls lb.	.15	.16	.15	.16	.15	.16
Chloride, 600 lb cks ...lb.	.07½	.07¾	.07½	.12	.09	.12
Dioxide, tech (peroxide), paper bags, c-l ......ton	...	47.50	...	47.50	47.50	62.50
Hydrate, bbls ....lb.	...	.32	...	.32	...	.32
Linoleate, liq, drs .....lb.	.18	.19¼	.18	.19¼	.18	.19¼
solid, precip, bbls ...lb.	...	.19	...	.19	...	.19
Resinate, fused, bbls...lb.	.08¼	.08½	.08¼	.08½	.08¼	.08½
precip, drs ....lb.	...	.12	...	.12	...	.12
Sulfate, tech, anhyd, 90-95%, 550 lb drs ...lb.	.07	.07½	.07	.07½	.07	.07½

Current

Mangrove
Octyl Acetate

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Mangrove, 55%, 400 lb bbls lb.	...	.04		.04	...	.04
Bark, African ....ton	...	26.00	23.00	26.00	23.00	24.50
Mannitol, pure cryst, cs, wks lb.	...	1.05	1.05	1.20	1.15	..45
commercial grd, 250 lb bbl ....lb.	.46	.57	...	...	...	...
Marble Flour, blk ......ton	12.00	13.00	12.00	13.00	12.00	13.00
Mercury chloride (Calomel) lb.	...	1.52	1.36	1.52	1.18	1.59
Mercury metal...76 lb. flasks	85.00	88.00	80.00	97.00	73.00	84.50
Mesityl Oxide, f.o.b. dest., tks. ....lb.	...	.10½	.10½	.20	...	...
drs, c.l. ....lb.	...	.11½	.11½	.21	...	...
drs, l.c.l. ....lb.	...	.12	.12	.21½	..	
Meta-nitro-aniline ....lb.	.67	.69	.67	.69	.67	.69
Meta-nitro-paratoluidine 200 lb bbls ....lb.	1.45	1.55	1.45	1.55	1.45	1.55
Meta-phenylene diamine 300 lb bbls ....lb.	.80	.84	.80	.84	.80	.84
Meta-toluene-diamine 300 lb bbls ....lb.	.65	.67	.65	.67	.65	.67
Methanol, denat, grd, drs, c-l, frt all'd ....gal.	...	.46	.41	.46	.30	.41
tks, frt all'd ....gal.	...	.40	.35	.40	.25	.35
Pure, drs, c-l, frt all'd gal.	...	.38	...	.38	...	.38
tks ....gal.	...	.33	...	.33	...	.33
95%, tks ....gal.	...	.31	...	.31	...	.31
97%, tks ....gal.	...	.32	...	.32	...	.32
Methyl Acetate, tech, tks, delv ....lb.		.06	.06	.06½	...	.06½
55 gal drs, delv .....lb.	.07	.08	.07	.08	.07½	.08
C.P. 97-99%, tks, delv lb.	...	.06¼	...	.06¼	.06¼	.07
55 gal drs, delv ....lb.	.07¼	.07¾	.07¼	.07¾	.07¼	.08½
Acetone, frt all'd, drs gal. *p*	.30	.36	.30	.36	.30	.40½
tks, frt all'd, drs ..gal. *p*	.25	.29	.25	.29	.25	.32½
Synthetic, frt all'd, east of Rocky M., drs ....gal. *p*	.38	.41	.38	.41	.38	.51
tks, frt all'd ...gal.	...	.31½	...	.31½	.31½	.39½
West of Rocky M., frt all'd, drs ..gal. *p*	...	.42	...	.42	.42	.46
tks, frt all'd...gal. *p*	...	.35	...	.35	.35	.39½
Anthraquinone ....lb.	...	.83	...	.83	...	.83
Butyl Ketone, tks .....lb.	...	.10½	...	.10½	...	.10½
Chloride, 90 lb cyl .....lb.	.32	.40	.32	.40	.32	.40
Ethyl Ketone, tks, frt all'd lb.	...	.05	...	.05	.05	.06
50 gal drs, frt all'd c-l lb.	..	.06	...	.06	.06	.07
Formate, drs, frt all'd ..lb.	.35	.36	.35	.36	.35	.36
Hexyl Ketone, pure, drs lb.	...	.60	...	.60	...	.60
Lactate, drs, frt all'd ..lb.	...	.30	...	.30	..	.30
Mica, dry grd, bgs, wks ..lb.	...	30.00	...	30.00	30.00	35.00
Michler's Ketone, kgs....lb.	...	2.50	...	2.50	...	2.50
Monoamylamine, c-l, drs, wks lb.	.52	1.00	.52	1.00	.52	1.00
Monobutylamine, drs, wks lb.	.52	.65	.62	.65	...	.65
Monochlorobenzene, see Chlorobenzene, mono						
Monoethanolamine, tks, wks lb.	...	.23	...	.23	...	.23
Monomethylamine, drs, frt all'd, E. Mississippi, c-l lb.	...	.65	...	.65	...	.65
Monomethylparaminosulfate, 100 lb drs ....lb.	3.75	4.00	3.75	4.00	3.75	4.00
Morpholine, drs 55 gal, lcl wks ....lb.		.75	...	...	...	...
Myrobalans 25%, liq bbls lb.	.03¾	.04¼	.03¾	.04¼	.03¾	.04¼
50% Solid, 50 lb boxes lb.	.04¼	.05	.04¼	.05	.04⅜	.06¼
J1 bgs ....ton	...	25.00	24.00	25.00	23.50	30.00
J2 bgs ....ton	...	19.00	...	19.00	17.00	22.00
R2 bgs ....ton	...	16.75	16.75	17.25	17.00	22.00
N						
Naphtha, v.m.&p. (deodorized) see petroleum solvents.						
Naphtha, Solvent, water-white, tks ....gal.	...	.26	...	.26	.26	.31
drs, c-l ....gal.	...	.31	...	.31	.31	.36
Naphthalene, dom, crude bgs, wks ....lb.	2.25	2.85	2.25	2.85	2.25	2.85
Imported, cif, bgs ...lb.	...	1.60	1.50	1.85	1.40	2.25
Balls, flakes, pks ......lb.	...	.06½	...	.06½	.06½	.08
Balls, ref'd, bbls, wks ..lb.	...	.05¾	...	.05¾	.05¾	.07¼
Flakes, ref'd, bbls, wks lb.	...	.05¾	...	.05¾	.05¾	.07¼
Nickel Carbonate, bbls ..lb.	.36	.37½	.36	.37½	.36	.37½
Chloride, bbls ....lb.	.18	.20	.18	.20	.18	.20
Metal ingot ....lb.	...	.35	..	.35	...	.35
Oxide, 100 lb kgs, NY lb.	.35	.37	.35	.37	.35	.37
Salt, 400 lb bbls, NY .lb.	.13	.13½	.13	.13½	.13	.13½
Single, 400 lb bbls, NY lb.	.13	.13½	.13	.13½	.13	.13½
Nicotine, 40%, drs, sulfate, 55 lb drs ....lb.	...	.70	.70	.76	...	.76
Nitre Cake, blk ....ton	...	16.00	...	16.00	...	16.00
Nitrobenzene, redistilled, 1000 lb drs, wks ....lb.	.08	.10	.08	.10	.08	.10
tks ....lb.		.07	.07	.07½	...	.07½
Nitrocellulose, c-l, l-c-l, wks lb.	.22	.29	.22	.29	.22	.29
Nitrogen Sol. 45½% ammon., f.o.b. Atlantic & Gulf ports, tks, unit ton	...	1.04		1.04	1.01	1.04
Nitrogenous Mat'l, bgs, imp unit	...	2.50	2.40	2.50	2.35	2.65
dom, Eastern wks ...unit	...	2.45	2.45	2.50	2.50	2.75
dom, Western wks ...unit	...	1.90	1.90	2.25	2.20	2.35
Nitronaphthalene, 550 lb bbls lb.	.24	.25	.24	.25	.24	.25
Nutgalls Alleppo, bgs ....lb.	.22½	.23	.22	.23	.23	.23
O						
Oak Bark Extract, 25%, bbls lb.	...	.03½	.03⅛	.03½	...	.03⅛
tks ....lb.	...	.02¾	...	.02¾	...	.02¾
Octyl Acetate, tks, wks ...lb.	...	.15	.15	.17	.16	.17

a Country is divided in 4 zones, prices varying by zone; *p* Country is divided into 4 zones. Also see footnote directly above; *q* Naphthalene quoted on Pacific Coast F.A S. Phila., or N. Y.

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Orange-Mineral, 1100 lb cks NY ....lb.	...	.10¼	...	.10¼	.09½	.10½
Orthoaminophenol, 50 lb kgs lb.	2.15	2.25	2.15	2.25	2.15	2.25
Orthoanisidine, 100 lb drs lb.	.70	.74	.70	.74	.70	.74
Orthochlorophenol, drs ...lb.	...	.32	...	.32	.32	.75
Orthocresol, drs, wks ....lb.	.16½	.17½	.16½	.17½	.13½	.17½
Orthodichlorobenzene, 1000 lb drs ....lb.	.06	.07	.06	.07	.06	.07
Orthonitrochlorobenzene, 1200 lb drs, wks ....lb.	.15	.18	.15	.18	.15	.18
Orthonitroparachlorphenol, tins ....lb.	...	.75	...	.75	...	.75
Orthonitrophenol, 350 lb drs ....lb.	.85	.90	.85	.90	.85	.90
Orthonitrotoluene, 1000 lb drs. wks ....lb.	.08	.10	.08	.10	.08	.10
Orthotoluidine, 350 lb bbls, l-c-l ....lb.	.16	.17	.16	.17	.16	.17
Osage Orange, cryst, bbls lb.	.19	.25	.17	.25	.17	.25
51° liquid ....lb.	...	.09	.07	.09	.07	.08
P						
Paraffin, rfd, 200 lb bgs						
122-127° M P ....lb.	.03¾	.039	.03¾	.039	.03¾	.04½
128-132° M P ....lb.	.04	.0435	.04	.0435	.04	.049
133-137° M P ....lb.	...	.0465	...	.0465	.0465	.05¾
Para aldehyde, 99%, tech, 110-55 gal drs, wks lb.	.10	.11¼	.10	.16*	.16*	.18*
Aminoacetanilid, 100 lb kgs ....lb.	...	.85	...	.85	...	.85
Aminohydrochloride, 100 lb kgs ....lb.	1.25	1.30	1.25	1.30	1.25	1.30
Aminophenol, 100 lb kgs lb.	...	1.05	...	1.05	...	1.05
Chlorophenol, drs ....lb.	.30	.45	.30	.45	.30	.45
Dichlorobenzene, 200 lb drs, wks ....lb.	.11	.12	.11	.12	.11	.12
Formaldehyde, drs, wks lb.	.34	.35	.34	.35	.34	.35
Nitroacetanilid, 300 lb bbls ....lb.	.45	.52	.45	.52	.45	.52
Nitroaniline, 300 lb bbls, wks ....lb.	.45	.47	.45	.47	.45	.47
Nitrochlorobenzene, 1200 lb drs, wks ....lb.	.15	.16	.15	.16	.15	.16
Nitro-orthotoluidine, 300 lb bbls ....lb.	2.75	2.85	2.75	2.85	2.75	2.85
Nitrophenol, 185 lb bbls lb.	.35	.37	.35	.37	.35	.37
Nitrosodimethylaniline, 120 lb bbls ....lb.	.92	.94	.92	.94	.92	.94
Nitrotoluene, 350 lb bbls lb.	...	.35	...	.35	...	.35
Phenylenediamine, 350 lb bbls ....lb.	1.25	1.30	1.25	1.30	1.25	1.30
Toluenesulfonamide, 175 lb bbls. ....lb.	.70	.75	.70	.75	.70	.75
tks, wks ....lb.	...	.31	...	.31	...	.31
Toluenesulfonchloride, 410 lb bbls, wks ....lb.	.20	.22	.20	.22	.20	.22
Toluidine, 350 lb bbls, wks ....lb.	.56	.58	.56	.58	.56	.58
Paris Green, dealers, drs lb.	.23	.26	.23	.26	.23	.26½
Pentane, normal, 28-38° C, group 3, tks ....gal.	...	.08½	...	.08½	...	.08½
drs, group 3 ....gal.	.11½	.16	.11½	.16	.11½	.16
Perchlorethylene, 100 lb drs, frt all'd ....lb.	.08	.08¾	.08	.10½	...	.10½
Petrolatum, dark amber, bbls ....lb.	.02⅝	.02¾	.02⅝	.02¾	.02⅝	.03⅞
Light, bbls ....lb.	.03⅛	.03⅜	.03⅛	.03⅜	.03⅛	.03⅜
Medium, bbls ....lb.	.02⅞	.03⅛	.02⅞	.03⅛	.02⅞	.03⅛
Dark green, bbls ....lb.	.02½	.02¾	.02½	.02¾	.02½	.02¾
Red, bbls ....lb.	.02½	.03⅝	.02½	.03⅝	.02½	.03⅝
White, lily, bbls ....lb.	.05¼	.07⅛	.05¼	.07⅛	.05¼	.07⅛
White, snow, bbls ....lb.	.06¼	.08⅛	.06¼	.08⅛	.06¼	.08⅛
Petroleum Ether, 30-60°, group 3, tks ....gal.	...	.13	...	.13	...	.13
drs, group 3 ....gal.	.14	.17	.14	.17	.14	.17
PETROLEUM SOLVENTS AND DILUENTS						
Cleaners naphthas, group 3. tks, wks ....gal.	.06⅜	.06⅝	.06⅜	.06⅝	.06⅜	.07⅜
East Coast, tks, wks gal	...	.10	...	.10	...	.10
Hydrogenated, naphthas, frt all'd East, tks ....gal.	...	.16	...	.16	...	.16
No. 2, tks ....gal	...	.18	...	.18	...	.18
No. 3, tks ....gal.	...	.16	...	.16	...	.16
No. 4, tks ....gal.	...	.18	...	.18	...	.18
Lacquer diluents, tks, East Coast ....gal.		.09	.09	.12½	.12	.12½
Group 3, tks ....gal.	.07⅜	.07⅝	.07⅜	.07⅝	.07⅜	.08⅜
Naphtha, V.M.P., East, tks wks ....gal.		.09	.09	.10	.09½	.10
Group 3, tks, wks . gal.	.06⅜	.06⅝	.06⅜	.06⅝	.06⅜	.07⅜
Petroleum thinner, 43-47, East, tks, wks ....gal		.08½	.08½	.10	.08½	.10
Group 3, tks, wks ..gal.	.05⅜	.05⅝	.05⅜	.05⅝	.05⅜	.06⅜
Rubber Solvents, stand grd East, tks, wks ....gal.		.09	.09	.10	.09½	.10
Group 3 tks, wks ...gal.	.06⅜	.06⅝	.06⅜	.06⅝	.06⅜	.07⅜
Stoddard Solvent, East, tks, wks ....gal.	...	.08½	.08½	.10	.09½	.10
Group 3, tks, wks ..gal.	.05⅞	.06⅛	.05⅞	.06⅛	.05⅞	.06⅞
Phenol, 250-100 lb drs ...lb.	.14½	.15½	.14½	.15½	.14½	.15½
tks, wks ....lb	...	.13½	...	.13½	...	.13½
Phenyl-Alpha-Naphthylamine, 100 lb kgs ....lb.	...	1.35	...	1.35	...	1.35
Phenyl Chloride, drs ....lb.	...	.17	...	.17	...	.17
Phenylhydrazine Hydrochloride, com ....lb.	...	1.50	...	1.50	...	1.50

* These prices were on a delivered basis.

	Current		1939		1938	
	Market		Low	High	Low	High
Phloroglucinol, tech, tins . . lb.	15.00	16.50	15.00	16.50	15.00	16.50
CP, tins . . . . lb.	20.00	22.00	20.00	22.00	20.00	22.00
Phosphate Rock, f.o.b. mines						
Florida Pebble, 68% basis ton	. . .	1.85	. . .	1.85	. . .	1.85
70% basis . . . . ton	. . .	2.35	. . .	2.35	. . .	2.35
72% basis . . . . ton	. . .	2.85	. . .	2.85	. . .	2.85
75-74% basis . . . . ton	. . .	3.85	. . .	3.85	. . .	3.85
75% basis . . . . ton	. . .	5.50	. . .	5.50	. . .	5.50
Tennessee, 72% basis . . ton	. . .	4.50	. . .	4.50	. . .	4.50
Phosphorus Oxychloride 175 lb cyl . . . . lb.	.16	.20	.16	.20	.16	.20
Red, 110 lb cases . . . . . lb.	40	.44	.40	.44	.40	.44
Sesquisulfide, 100 lb cs . . lb.	.38	.44	.38	.44	.38	.44
Trichloride, cyl . . . . lb.	.15	.18	.15	.18	.15	.18
Yellow, 110 lb cs, wks . lb.	.24	.30	.24	.30	.24	.30
Phthalic Anhydride, 100 lb drs, wks . . . . lb.	. . .	.14½	. . .	.14½	. . .	.14½
Pine Oil, 55 gal drs or bbls						
Destructive dist . . . . lb.	46	.48	.46	.48	.46	.55
Steam dist wat wh bbls gal.	. . .	.59	. . .	.59	. . .	.59
tks . . . . gal.	. . .	.54	. . .	.54	. . .	.54
Pitch Hardwood, wks . . . ton	18.25	18.75	18.25	18.75	18.25	18.75
Coaltar, bbls, wks . . . . ton	. . .	19.00	. . .	19.00	. . .	19.00
Burgundy, dom, bbls, wks lb.	.05½	.06½	.05½	.06½	.05½	.06½
Imported . . . . lb.	.15	.16	.15	.16	.15	.16
Petroleum, see Asphaltum in Gums' Section.						
Pine, bbls . . . . bbl.	6.00	6.25	6.00	6.25	5.75	6.25
Stearin, drs . . . . lb.	.03	.04½	.03	.04½	.03	.04½
Platinum, ref'd . . . . oz.	32.00	35.00	32.00	35.00	30.00	39.00
POTASH						
Potash, Caustic, wks, sol . . lb.	.06¼	.06½	.06¼	.06½	.06¼	.06½
flake . . . . lb.	.07	.07⅜	.07	.07⅜	.07	.07⅜
Liquid, tks . . . . lb.	. . .	.02⅞	. . .	.02⅞	. . .	.02⅞
Manure Salts, imported 30% basis, blk . . . . unit	. . .	.58½	. . .	.58½	. . .	.58½
Potassium Abietate, bbls . lb.	. . .	.09	. . .	.09	.08	.13
Acetate, tech, bbls, delv lb.	. . .	.26	. . .	.26	.26	.28
Bicarbonate, USP, 320 lb bbls . . . . lb.	. . .	.18	. . .	.18	. . .	.18
Bichromate Crystals, 725 lb cks* . . . . lb.	.08¾	.09¼	.08¾	.09¼	.08¾	.09¼
Binoxalate, 300 lb bbls . . lb.	. . .	.23	. . .	.23	. . .	.23
Bisulfate, 100 lb kgs . . . . lb.	.15½	.18	.15½	.18	.15½	.18
Carbonate, 80-85% calc 800 lb cks . . . . lb.	.06½	.07	.06½	.07	.06½	.07
liquid, tks . . . . lb.	. . .	.02⅞	. . .	.02⅞	. . .	.02⅞
drs, wks . . . . lb.	.03	.03½	.03	.03½	.03	.03½
Chlorate crys, 112 lb kgs, wks . . . . lb.	.09¼	.09½	.09¼	.09½	.09¼	.09½
gran, kgs . . . . lb.	.12	.13	.12	.13	.12	.13
powd, kgs . . . . lb.	.08½	.08¾	.08½	.08¾	.08½	.08¾
Chloride, crys, bbls . . . . lb.	.04	.04¾	.04	.04¾	.04	.04¾
Chromate, kgs . . . . lb.	.19	.28	.19	.28	.19	.28
Cyanide, 110 lb cases . . . lb.	.50	.55	.50	.55	.50	.57½
Iodide, 250 lb bbls . . . . lb.	. . .	1.13	. . .	1.13	.93	1.13
Metabisulfite, 300 lb bbls lb.	.11	.12½	.11	.13½	.12	.15
Muriate, bgs, dom, blk unit	. . .	.53½	. . .	.53½	. . .	.53½
Oxalate, bbls . . . . lb.	.25	.26	.25	.26	.25	.26
Perchlorate, kgs, wks . . . lb.	.09	.10½	.09	.10½	.09	.11½
Permanganate, USP, crys, 500 & 1000 lb drs, wks lb.	.18½	.19½	.18½	.19½	.18½	.19½
Prussiate, red, bbls . . . . lb.	.30½	.34	.30½	.34	.30½	.37
Yellow, bbls . . . . lb.	.14	.15	.14	.16	.15	.16
Sulfate, 90% basis, bgs ton	. . .	38.00	. . .	38.00	. . .	38.00
Titanium Oxalate, 200 lb bbls . . . . lb.	.35	.40	.35	.40	.35	.40
Pot & Mag Sulfate, 48% basis bgs . . . . ton	. . .	25.75	. . .	25.75	. . .	25.75
Propane, group 3, tks . . . . lb.	.03	.04⅜	.03	.04⅜	.03	.04⅜
Putty, coml, tubs . . . 100 lb.	. . .	3.00	. . .	3.00	2.25	3.00
Linseed Oil, kgs . . . . 100 lb.	. . .	4.50	. . .	4.50	4.00	4.65
Pyrethrum, conc liq:						
2.4% pyrethrins, drs, frt all'd . . . . gal.	6.45	6.60	5.75	6.60	5.00	6.75
3.6% pyrethrins, drs, frt all'd . . . . gal.	9.40	9.55	8.45	9.55	7.65	9.95
Flowers, coarse, Japan, bgs . . . . lb.	.29	.29½	.26	.29½	.18	.28½
Fine powd, bbls . . . . . lb.	.30	.31	.27	.31	.19	.30
Pyridine, denat, 50 gal drs gal.	. . .	1.63	. . .	1.63	1.53	1.63
Refined, drs . . . . lb.	. . .	.50	. . .	.50	.45	.50
Pyrites, Spanish cif Atlantic ports, blk . . . . unit	.12	.13	.12	.13	.12	.13
Pyrocatechin, CP, drs, tins lb.	2.15	2.75	2.15	2.75	2.15	2.75
Q						
Quebracho, 35% liq tks . . lb.	. . .	.02⅞	.02⅞	.03⅜	.03	.03⅜
450 lb bbls, c-l . . . . . . lb.	. . .	.04	.04	.04⅛	.03½	.04⅛
Solid, 63%, 100 lb bales cif . . . . lb.	. . .	.04	. . .	.04	. . .	.04
Clarified, 64%, bales . . lb.	. . .	.04¼	. . .	.04¼	. . .	.04¼
Quercitron, 51 deg liq, 450 lb bbls . . . . lb	.07½	.08½	.07½	.08½	.06	.08½
Solid, drs . . . . lb.	.10	.12	.10	.12	.10	.12
R						
R Salt, 250 lb bbls, wks . lb.	.52	.55	.52	.55	.52	.55
Resorcinol tech, cans . . . . . lb.	.75	.80	.75	.80	.75	.80
Rochelle Salt, cryst . . . . . lb.	.18¾	.19¼	.17¾	.19¼	.15	.18¼
Powd, bbls . . . . lb.	.17¾	.18¼	.16¾	.18¼	.16	.18½
Rosin Oil, bbls, first run gal.	.45	.47	.45	.47	.45	.60
Second run . . . . gal.	.47	.49	.47	.49	.47	.62
Third run, drs . . . . gal.	.51	.53	.51	.53	.51	.66

* Spot price is ½c higher.

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Rosins 600 lb bbls, 280 lb unit ex. yard NY:***						
B	...	4.60	4.60	5.10	4.65	6.00
D	...	5.00	4.95	5.30	4.75	6.00
E	...	5.25	5.20	5.40	4.90	6.00
F	...	5.50	5.50	5.77½	5.05	7.00
G	...	6.10	5.75	7.00	5.25	7.05
H	...	6.20	5.75	7.10	5.25	7.15
I	...	6.20	5.77½	7.12½	5.25	7.15
K	...	6.25	5.80	7.15	5.25	7.25
M	...	6.40	5.90	7.25	5.25	7.40
N	...	6.45	6.75	7.40	6.20	7.50
WG	...	7.20	7.20	7.70	6.75	8.45
WW	...	7.65	7.65	8.50	7.55	9.15
Rosins, Gum, Savannah (280 lb unit):**						
B	...	3.35	3.25	3.75	3.25	4.60
D	...	3.75	3.55	4.00	3.50	4.60
E	...	4.00	3.80	4.10	3.55	4.60
F	...	4.25	4.10	4.37½	3.90	5.60
G	...	4.85	4.40	5.60	4.10	5.65
H	...	4.95	4.40	5.70	4.20	5.75
I	...	4.95	4.40	5.72½	4.20	5.85
K	...	5.00	4.40	5.75	4.20	6.00
M	...	5.15	4.40	5.85	4.20	6.15
N	...	5.20	5.20	6.00	4.80	6.20
WG		5.95	5.80	6.30	5.40	7.05
WW	...	6.40	6.30	7.10	6.10	7.75
X	...	6.40	6.30	7.10	6.10	7.75
Rosin, Wood, c-l, FF grade, NY	4.00	6.17½	5.35	5.25	5.05	6.40
Rotten Stone, bgs mines . . ton	25.50	37.50	22.50	37.50	22.50	35.00
Imported, lump, bbls . . lb.	...	.14	...	.14	.12	.14
Powdered, bbls . . . . . . lb.	.08½	.10	.08½	.10	.08½	.10

S

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Sago Flour, 150 lb bgs . . . lb.	.02½	.03½	.02½	.03½	.02½	.03¾
Sal Soda, bbls, wks . . . 100 lb.	...	1.20	...	1.20	...	1.20
Salt Cake, 94-96%, c-l, wks ton	19.00	25.00	19.00	25.00	19.00	23.00
Chrome, c-l, wks . . . . . ton	11.00	12.00	11.00	12.00	11.00	12.00
Saltpetre, gran, 450-500 lb bbls . . . . . . lb.	.06½	.069	.06½	.069	.06½	.069
Cryst, bbls . . . . . . lb.	.07½	.0865	.07½	.0865	.07½	.0865
Powd, bbls . . . . . . lb.	.07½	.079	.07½	.079	.07½	.079
Satin, White, pulp, 550 lb bbls . . . . . . lb.	.01¼	.01½	.01¼	.01½	.01¼	.01½
Schaeffer's Salt, kgs . . . . . lb.	.46	.48	.46	.48	.46	.48
Shellac, Bone dry, bbls . . lb. r	.18	.19	.18	.20	.16½	.20
Garnet, bgs . . . . . . lb.	.12½	.13	.12½	.13	.12½	.15
Superfine, bgs . . . . . . lb. s	.10½	.11	.10½	.11½	.11	.13½
T. N., bgs . . . . . . lb. s	.10	.10½	.10	.11	.10½	.12½
Silver Nitrate, vials . . . . . oz.	.31½	.33½	.31½	.33½	.33½	.34⅞
Slate Flour, bgs, wks . . . ton	9.00	10.00	9.00	10.00	9.00	10.00
Soda Ash, 58% dense, bgs, c-l, wks . . . . . 100 lb.	...	1.10	...	1.10	...	1.10
58% light, bgs . . . . . 100 lb.	...	1.08	...	1.08	...	1.08
blk . . . . . . 100 lb.	...	.90	...	.90	...	.90
paper bgs . . . . . . 100 lb.	...	1.05	...	1.05	...	1.05
bbls . . . . . . 100 lb.	...	1.35	...	1.35	...	1.35
Caustic, 76% grnd & flake, drs . . . . . . 100 lb.	...	2.70	...	2.70	...	2.70
76% solid, drs . . . . 100 lb.	...	2.30	...	2.30	...	2.30
Liquid sellers, tks . . 100 lb.	...	1.97½	...	1.97½	...	1.97½
Sodium Abietate, drs . . . . lb.	...	.11	...	.11	.10	.13
Acetate, 60% tech, gran, powd, flake, 450 lb bbls wks . . . . . . lb.	.04	.05	.04	.05	.04	.05
anhyd, drs, delv . . . . . lb.	...	.08¼		.08¼	...	.08¼
Alginate, drs . . . . . . lb.	.71	.95	.70	.95	.69	.70
Antimoniate, bbls . . . . . . lb.	.11½	.12	.11½	.12½	.12	.15¼
Arsenate, drs . . . . . . lb.	.08	.08½	.08	.08½	.08	.08½
Arsenite, liq, drs . . . . . gal.	...	.35	.30	.35	.30	.33
Dry, gray, drs, wks . . lb.	.07½	.09½	.07½	.09½	.07½	.09½
Benzoate, USP kgs . . . lb.	.46	.48	.46	.48	.46	.48
Bicarb, powd, 400 lb bbl, wks . . . . . . 100 lb.	...	1.85	...	1.85	...	1.85
Bichromate, 500 lb cks, wks*	.06¾	.07¼	.06¾	.07¼	.06¾	.07¼
Bisulfite, 500 lb bbls, wks lb.	.033	.036	.03¼	.036	.03	.036
35-40% sol bbls, wks 100 lb.	1.40	1.80	1.40	1.80	1.40	1.80
Chlorate, bgs, wks . . . . . lb.	.06¼	.07½	.06¼	.07½	.06¼	.07½
Cyanide, 96-98%, 100 & 250 lb drs, wks . . . . . lb.	.14	.15	.14	.15	.14	.17½
Diacetate, 33-35% acid, bbls, lcl, delv . . . . . . lb.	...	.09	...	.09	...	.09
Fluoride, white 90%, 300 lb. bbls, wks . . . . . . lb.	.07¼	.08¾	.07¼	.08¾	.07½	.08¼
Hydrosulfite, 200 lb bbls, f.o.b. wks . . . . . . lb.	.16	.17	.16	.17	.16	.17
Hyposulfite, tech, pea crys 375 lb bbls, wks 100 lb.	...	2.80	...	2.80	2.50	2.80
Tech, reg cryst, 375 lb bbls, wks . . . . . . 100 lb.	2.45	2.80	2.45	2.80	2.40	2.80
Iodide, jars . . . . . . lb.	...	2.10	...	2.10	1.90	2.10
Metal, drs, 280 lbs . . . . lb.	...	.19	...	.19	...	.19
Metanilate, 150 lb bbls . . lb.	.41	.42	.41	.42	.41	.42
Metasilicate, gran, c-l, wks . . . . . . 100 lb.	...	2.20	...	2.20	2.15	2.20
cryst, drs, c-l, wks 100 lb.	...	2.90	...	2.90	2.75	2.90
Monohydrated, bbls . . . . lb.	...	.023	...	.023	...	.023
Naphthenate, drs . . . . . . lb.	.12	.19	.12	.19	.12	.19
Naphthionate, 300 lb bbl lb.	...	.50	.50	.54	.52	.54

r Bone dry prices at Chicago 1c higher; Boston ½c; Pacific Coast 2c; Philadelphia deliveries f.o.b. N. Y.; refined 6c higher in each case; s T. N. and Superfine prices quoted f.o.b. N. Y. and Boston; Chicago prices 1c higher; Pacific Coast 3c; Philadelphia f.o.b. N. Y. * Spot price is ⅛c higher. ** May 26. *** May 26.

Current

Sodium Nitrate
Tar Acid Oil

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Sodium (continued):						
Nitrate, 92%, crude, 200 lb bgs, c-l, NY ....ton	...	28.30	...	28.30	...	28.30
100 lb bgs ....ton	...	29.00	...	29.00	...	29.00
Bulk ....ton	...	27.00	...	27.00	...	27.00
Nitrite, 500 lb bbls .. lb.	.06¾	.11½	.06¾	.11½	.06¾	.11½
Orthochlorotoluene, sulfonate, 175 lb bbls, wks. .lb.	.25	.27	.25	.27	.25	.27
Orthosilicate, 300 lb drs, c.l. ....lb.	...	2.90	2.90	2.90	2.90	2.90
Perborate, drs, 400 lbs. .lb.	.14¾	.15¼	.14¾	.15¼	.14¾	.15¼
Peroxide, bbls, 400 lb. .lb.	...	.17	...	.17	...	.17
Phosphate, di-sodium, tech, 310 lb bbls, wks 100 lb.	...	2.05	...	2.05	...	2.05
bgs, wks ......100 lb.	...	1.85	...	1.85	...	1.85
Tri-sodium, tech, 325 lb bbls, wks ......100 lb.	...	2.20	...	2.20	...	2.20
bgs, wks ......100 lb.	...	2.00	...	2.00	...	2.00
Picramate, 160 lb kgs. .lb.	.65	.67	.65	.67	.65	.67
Prussiate, Yellow, 350 lb bbl, wks ....lb.	.09½	.10	.09½	.10	.09	.11½
Pyrophosphate, anhyd, 100 lb bbls f.o.b. wks frt eq lb.	...	.0530	...	.0530	.0530	.10
Sesquisilicate, drs, c-l, wks ....100 lb.	...	2.80	...	2.80	2.80	3.00
Silicate, 60°, 55 gal drs, wks ....100 lb.	1.65	1.70	1.65	1.70	1.65	1.70
40°,55 gal drs, wks 100 lb.	...	.80	...	.80	...	.80
tks, wks ......100 lb.	...	.65	...	.65	...	.65
Silicofluoride, 450 lb bbls NY ....lb.	.04½	.04¾	.04½	.04¾	.04¾	.06½
Stannate, 100 lb drs ...lb.	.32	.35	.30	.35	.25½	.34
Stearate, bbls ....lb.	.19	.24	.19	.24	.19	.24
Sulfanilate, 400 lb bbls lb.	.16	.18	.16	.18	.16	.18
Sulfate Anhyd, 550 lb bgs* c-l, wks ......100 lb. †	1.45	1.90	1.45	1.90	1.45	1.90
Sulfide, 80% cryst, 440 lb bbls, wks ....lb.	...	.02¼	...	.02¼	...	.02¼
Solid, 650 lb drs, c-l, wks ....lb.	...	.03	...	.03	...	.03
Sulfite, cryst, 400 lb bbls, wks ....lb.	.023	.02½	.023	.02½	.023	.02½
Sulfocyanide, drs .....lb.	.28	.47	.28	.47	.28	.47
Sulforicinoleate, bbls...lb.	...	.12	...	.12	...	.12
Tungstate, tech, crys, kgs lb.	1.05	1.10	1.05	1.10	1.05	1.35
Sorbitol, com, solut, wks c-l, drs, wks ....lb.	...	.15½	...	.15½	.15½	.19
Spruce Extract, ord, tks. .lb.	...	.01⅛	...	.01⅛	...	.01⅛
Ordinary, bbls ....lb.	...	.01⅝	...	.01⅝	...	.01⅝
Super spruce ext, tks ..lb.	...	.01⅜	...	.01⅜	...	.01⅜
Super spruce ext, bbls. .lb.	...	.01⅞	...	.01⅞	...	.01⅞
Super spruce ext, powd, bgs ....lb.	...	.04	...	.04	...	.04
Starch, Pearl, 140 lb bgs 100 lb.	2.55	2.85	2.50	2.85	2.40	3.18
Powd, 140 lb bgs ..100 lb.	2.65	2.85	2.60	2.90	2.50	3.28
Potato, 200 lb bgs .....lb.	.04	.05	.04	.05	.03½	.05½
Imp, bgs ....lb.	.05	.06	.05	.06	.05	.06
Rice, 200 lb bbls ......lb.	.06¼	.07¼	.06¼	.07¼	.06¼	.07¼
Sweet Potato, 240 lb bbls, f.o.b. plant ......100 lb.	7.25	7.50	7.25	7.50	...	...
Wheat, thick, bgs .....lb.	.05	nom.	.05	.05½	.06¼	.07
Strontium carbonate, 600 lb bbls, wks ....lb.	.16½	.17½	.16½	.17½	.16½	.17
Nitrate, 600 lb bbls, NY lb.	.07¾	.08¼	.07¾	.08¼	.07¾	.09¼
Sucrose octa-acetate, den, grd, bbls, wks ....lb.	...	.45	...	.45	...	.45
tech, bbls, wks ....lb.	...	.40	...	.40	...	.40
Sulfur, crude, f.o.b. mines ton	...	16.00	...	16.00	16.00	19.00
Flour, coml, bgs ...100 lb.	1.65	2.35	1.65	2.35	1.65	2.35
bbls ....100 lb.	1.95	2.70	1.95	2.70	1.95	2.70
Rubbermakers, bgs..100 lb.	2.20	2.80	2.20	2.80	2.20	2.80
bbls ....100 lb.	2.55	3.15	2.55	3.15	2.55	3.15
Extra fine, bgs ....100 lb.	2.85	3.00	2.85	3.00	2.85	3.00
Superfine, bgs .....100 lb.	2.65	2.80	2.65	2.80	2.65	2.80
bbls ....100 lb.	2.25	3.10	2.25	3.10	2.25	3.10
Flowers, bgs ......100 lb.	3.00	3.75	3.00	3.75	3.00	3.75
bbls ....100 lb.	3.35	4.10	3.35	4.10	3.35	4.10
Roll, bgs ....100 lb.	2.35	3.10	2.35	3.10	2.35	3.10
bbls ....100 lb.	2.50	3.25	2.50	3.25	2.50	3.25
Sulfur Chloride, 700 lb drs, wks ....lb.	.03	.04	.03	.04	.03	.04
Sulfur Dioxide, 150 lb cyl lb.	.07	.09	.07	.09	.07	.09
Multiple units, wks ...lb.	.04½	.07	.04½	.07	.04½	.07
tks, wks ....lb.	.04	.05	.04	.05	.04	.05
Refrigeration, cyl, wks lb.	.16	.17	.16	.17	.16	.17
Multiple units, wks ...lb.	.07½	.10	.07½	.10	.07½	.10
Sulfuryl Chloride ....lb.	.15	.40	.15	.40	.15	.40
Sumac, Italian, grd .....ton	...	66.50	66.00	67.00	62.00	68.00
Extract, 42°, bbls ....lb.	.05¼	.06¼	.05¼	.06¼	.05¼	.06¼
Superphosphate, 16% bulk, wks ....ton	...	8.00	...	8.00	8.00	9.00
Run of pile ....ton	...	7.50	...	7.50	7.50	8.50
Triple, 40-48%, a.p.a. bulk, wks, Balt. unit .....ton	...	.70	...	.70	.70	.85
Talc, Crude, 100 lb bgs, NY ton	13.00	15.00	13.00	15.00	13.00	15.00
Ref'd, 100 lb bgs, NY ton	14.00	16.00	14.00	16.00	14.00	16.00
French, 220 lb bgs, NY ton	23.00	30.00	23.00	30.00	23.00	30.00
Ref'd, white, bgs, NY ton	45.00	60.00	45.00	60.00	45.00	60.00
Italian, 220 lb bgs to arr ton	60.00	62.00	60.00	62.00	60.00	62.00
Ref'd, white, bgs, NY ton	65.00	70.00	65.00	70.00	65.00	70.00
Tankage Grd, NY ...unit ‡	...	3.00	3.00	3.25	2.50	3.15
Ungrd ....unit ‡	...	3.50	3.00	3.55	2.35	3.00
Fert grade, f.o.b. Chgo unit ‡	...	3.25	3.00	3.50	2.25	3.00
South American cif unit ‡	...	3.25	3.10	3.35	3.00	3.45
Tapioca Flour, high grade, bgs ....lb.	.02¼	.04¼	.01¾	.05½	.02	.05½
Tar Acid Oil, 15%, drs. .gal.	.21	.24	.21	.24	.21	.25½
25%, drs ....gal.	.25	.28	.25	.28	.25	.29½

† Bags 15c lower; ‡ + 10; * Bbls. are 20c higher.

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Tar, pine, delv, drs ..... gal.	.25	.26	.25	.26	. .	.26
tks, delv, E. cities .... gal.	...	.20	.	.20	...	.20
Tartar Emetic, tech, bbls lb.	.27¾	.28	.27¾	.28	.26¾	.28
USP, bbls .... lb.	.33	.33½	.33	.33½	.32	.33½
Terpineol, den grade, drs lb.	...	.17	. .	.17		.17
Tetrachlorethane, 650 lb drs lb.	.08	.08½	.08	.08½	.08	.08½
Tetrachloroethylene, drs, tech lb.	...	.09½	...	.09½	...	.09½
Tetralene, 50 gal drs, wks lb.	.12	.13	.12	.13	.12	.13
Thiocarbanilid, 170 lb bbls lb.	.20	.25	.20	.25	.20	.25
Tin, crystals, 500 lb bbls, wks lb.	.38	.38½	.35½	.38½	.31	.36½
Metal, NY .... lb.	...	.4885	.4520	.4885	.3570	.4675
Oxide, 300 lb bbls, wks lb.	.52	.54	.50	.54	.44	.50
Tetrachloride, 100 lb drs, wks .... lb.	...	.24¾	.23	.24¾	.18½	.23½
Titanium Dioxide, 300 lb bbls lb.	.14½	.16	.14½	.16	.14½	.17
Barium Pigment, bbls .. lb.	.05⅝	.05⅞	.05⅝	.05⅞	.05⅝	.06⅛
Calcium Pigment, bbls .. lb.	.05⅝	.05⅞	.05⅝	.05⅞	.05⅝	.06⅛
Toluidine, mixed, 900 lb drs, wks .... lb.	.26	.27	.26	.27	.26	.27
Toluol, 110 gal drs, wks .. gal.	...	.27	...	.27	.27	.35
8000 gal tks, frt all'd .. gal.	...	.22	...	.22	.22	.30
Toner Lithol, red, bbls ... lb.	.62	.67	.62	.80	.75	.80
Para, red, bbls .... lb.	.75	.80	.75	.80	.75	.80
Toluidine, bgs .... lb.	...	1.35	...	1.35	...	1.35
Triacetin, 50 gal drs, wks lb.	...	.36	...	.36	...	.36
Triamyl Borate, lcl, drs, wks lb.	..	.27	...	.27	...	.27
Triamylamine, c-l, drs, wks lb.	.77	1.25	.77	1.25	.77	1.25
Tributylamine, lcl, drs, wks lb.	...	.70	...	.70	...	.70
Tributyl citrate, drs, frt all'd lb.	...	.45	...	.45	...	.45
Tributyl Phosphate, frt all'd lb.	...	.42	...	.42	.42	.50
Trichlorethylene, 600 lb drs, frt all'd E. Rocky Mts .. lb.	.08	.08¾	.08	.09½	.089	.09½
Tricresyl phosphate, tech, drs lb.	.23	.37½	.23	.37½	.23	.39
Triethanolamine, 50 gal drs wks .... lb.	.21	.22	.21	.22	.21	.22
tks, wks .... lb.	...	.20	...	.20	...	.20
Triethylene glycol, drs, wks lb.	...	.26	...	.26	...	.26
Trihydroxyethylamine Oleate, bbls .... lb.	...	.30	...	.30	...	.30
Stearate, bbls .... lb.	...	.30	...	.30	...	.30
Trimethyl Phosphate, drs, lcl f.o.b. dest .... lb.	...	.50	...	.50	...	.50
Trimethylamine, c-l, drs, frt all'd E. Mississippi .... lb.	...	1.00	...	1.00	...	1.00
Triphenylguanidine ...... lb.	.58	.60	.58	.60	.58	.60
Triphenyl Phosphate, drs lb.	...	.38	...	.38	.34	.38
Tripoli, airfloated, bgs, wks ton	26.00	30.00	26.00	30.00	26.00	30.00
Turpentine (Spirits), c-l, NY dock, bbls .... gal.	...	.29**	.29	.35*	.26½	.31½
Savannah, bbls .... gal.	...	.23½*	.23½	.29*	.20½	.30¾
Jacksonville, bbls ..... gal.	...	.23½*	.23½	.26¾	.20½	.30¾
Wood Steam dist, bbls, c-l, NY .... gal.	.25	.28	.242	.30	.242	.31
Wood, dest dist, c-l, drs, delv E. cities ...... gal.	.22	.24	.22	.24	.22	.36
U						
Urea, pure, 112 lb cases .. lb.	.14½	.15½	.14½	.15½	.14½	.15½
Fert grade, bgs, c.i.f. .. ton						
c.i.f. S.A. points .... ton	95.00	110.00	95.00	110.00	95.00	110.00
Dom. f.o.b., wks ...... ton	95.00	101.00	95.00	101.00	95.00	101.00
Urea Ammonia liq 55% NH_3, tks .... unit	...	nom.	...	nom.	1.00	1.04
V						
Valonia beard, 42%, tannin bgs .... ton	...	46.00	45.00	47.00	45.00	52.00
Cups, 32% tannin, bgs .. ton	28.00	30.00	28.00	31.00	30.00	37.50
Extract, powd, 63% ... lb.	...	.06	...	.06	...	.06
Vanillin, ex eugenol, 25 lb tins, 2000 lb lots .... lb.	...	2.20	...	2.20	2.10	3.10
Ex-guaiacol .... lb.	...	2.10	...	2.10	2.00	3.00
Ex-lignin .... lb.		2.10		2.10	2.00	2.25
Vermilion, English, kgs .. lb.	1.52	1.64	1.50	1.70	1.45	1.69
W						
Wattle Bark, bgs .... ton	34.50	38.00	34.50	38.50	36.00	41.75
Extract, 60°, tks, bbls .. lb.	...	.04	.04	.04⅜	.04⅜	.04⅝
WAXES						
Wax, Bayberry, bgs ..... lb.	.22½	.23	.16⅞	.23	.16⅞	.17
Bees, bleached, white 500 lb slabs, cases ...... lb.	.37	.39	.37	.39	.35	.45
Yellow, African, bgs .. lb	.19½	.20	.18½	.20	.19	.26
Brazilian, bgs ..... lb.	.22½	.23½	.21	.23½	.22	.29
Chilean, bgs ...... lb.	.22½	.23½	.21	.23½	.22	.29
Refined, 500 lb slabs, cases lb	.25½	.26	.25½	.33	.32	.39
Candelilla, bgs .... lb.	.15½	.16½	.15¼	.16½	.13½	.16
Carnauba, No. 1, yellow, bgs .... lb.	.40½	.42	.36¾	.42	.38	.44
No. 2, yellow, bgs ... lb.	.39½	.40	.35¾	.40	.36	.42
No. 2, N. C., bgs .... lb.	.36¾	.37	.34	.37	.34	.40
No. 3, Chalky, bgs ... lb.	.30	.31½	.27½	.31½	.29	.35½
No. 3, N. C., bgs ... lb.	.30½	.31	.28¾	.31½	.30	.35½
Ceresin, dom, bgs ..... lb.	.08½	.11½	.08½	.11½	.08½	.11½
Japan, 224 lb cases .... lb.	.11¼	.11½	.09¾	.11½	.09¼	.11
Montan, crude, bgs .... lb.	.11	.11¾	.11	.11¾	.11	.12⅛
Paraffin, see Paraffin Wax.						
Spermaceti, blocks, cases lb.	.18	.21	.18	.21	.22	.24
Cakes, cases .... lb.	.19	.22	.19	.22	.23	.25
Whiting, chalk, com 200 lb bgs c-l, wks .... ton	12.00	14.00	12.00	14.00	12.00	14.00
Gilders, bgs, c-l, wks .. ton	...	15.00	...	15.00	...	15.00
Wood Flour, c-l, bgs ... ton	20.00	30.00	20.00	30.00	20.00	33.00
Xylol, frt all'd, East 10° tks, wks .... gal.	...	.29	...	.29	.29	.33
Coml, tks, wks, frt all'd, gal.	...	.26	...	.26	.26	.30
Xylidine, mixed crude, drs lb.	.35	.36	.35	.36	.35	.36
Zinc Acetate, tech, bbls, lcl, delv .... lb.	.15	.16	.15	.21	...	.21
Arsenite, bgs, frt all'd .. lb.	.12	.12½	.12	.13	.12½	.13
Carbonate tech, bbls, NY lb.	.14	.15	.14	.15	.14	.15

* May 26; **May 26.

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Zinc (continued):						
Chloride fused, 600 lb drs, wks ... lb.	.04¼	.046	.04¼	.046	.04¼	.046
Gran, 500 lb drs, wks lb.	.05	.05¾	.05	.05¾	.05	.05¾
Soln 50%, tks, wks 100 lb.	...	2.25	...	2.25	...	2.25
Cyanide, 100 lb drs ... lb.	...	.33	...	.33	.33	.38
Dust, 500 lb bbls, c-l, delv lb.	...	.06½	.06½	.06¾	.06	.0740
Metal, high grade slabs, c-l, NY ... 100 lb.	...	4.90	4.84	4.90	4.35	5.45
E. St. Louis ... 100 lb.	...	4.50	...	4.50	4.00	5.05
Oxide, Amer, bgs, wks lb.	.06¼	.07½	.06¼	.07½	.06	.07½
French 300 lb bbls, wks lb.	.06½	.07¾	.06½	.07¾	.06¼	.07¾
Palmitate, bbls ... lb.	.23	.25	.23	.25	.23	.25
Resinate, fused, pale bbls lb.	...	.10	...	.10	...	.10
Stearate, 50 lb bbls ... lb.	.20	.23	.20	.23	.20	.23
Zinc Sulfate, crys, 400 lb bbl, wks ... lb.	...	.029	...	.029	.029	.033
Flake, bbls ... lb.	...	.0325	...	.0325	.0325	.0375
Sulfide, 500 lb bbls, delv lb.	.08⅛	.08⅜	.08⅛	.08⅞	.08⅝	.09¾
bgs, delv ... lb.	.07⅞	.08⅛	.07⅞	.08⅝	.08⅜	.09
Sulfocarbolate, 100 lb kgs lb.	.24	.26	.24	.26	.24	.26
Zirconium Oxide, crude, 73-75% grd, bbls, wks ... ton	75.00	100.00	75.00	100.00	75.00	100.00

Oils and Fats

	Current Market		1939 Low	1939 High	1938 Low	1938 High
Babassu, tks, futures ... lb.	...	.06⅜	.06⅛	.06½	.06⅛	.06¾
Castor, No. 3, 400 lb drs lb.	.08¼	.09	.08¼	.10	.09¼	.10¾
Blown, 400 lb drs ... lb.	.10¼	.11	.10¼	.12	.11¼	.13
China Wood, drs, spot NY lb.	...	.17¾	.15	.17¾	.10¼	.15½
Tks, spot NY ... lb.	.17	.17¼	.14½	.17¼	.095	.15½
Coconut, edible, drs NY lb.	.08⅛	.08⅝	.08⅛	.08⅝	.08⅛	.09½
Manila, tks, NY ... lb.	...	.03⅛	...	.03⅛	.03⅛	.04¼
Tks, Pacific Coast ... lb.	...	.03	.02⅝	.03	.02⅝	.03¾
Cod, Newfoundland, 50 gal bbls ... gal.	.32	.33	.29	.35	.35	.52
Copra, bgs, NY ... lb.	...	.0190	.0170	.0180	.0170	.0235
Corn, crude, tks, mills ... lb.	.05⅞	.06	.05⅞	.06¼	.06⅜	.08¼
Refd, 375 lb bbls, NY lb.	.08¾	.09	.08¾	.09¾	.09¼	.10½
Degras, American, 50 gal bbls NY ... lb.	.07	.08	.07	.08	.07½	.08¼
English, bbls, NY ... lb.	.07	.08	.07	.08	.07½	.08¼
Greases, Yellow ... lb.	.04⅞	.05	.04½	.05⅛	.03½	.05½
White, choice bbls, NY lb.	.05⅛	.05½	.05⅛	.06	.05	.07
Lard, Oil, edible, prime lb.	...	.09¾	.09¾	.10¼	.10¼	.12¾
Extra, bbls ... lb.	...	.09	.09	.09⅜	.08¾	.10¾
Extra, No. 1, bbls ... lb.	...	.08⅞	.09	.09¼	.08⅝	.09¾
Linseed, Raw less than 5 bbl lots ... lb.	...	.10	.093	.10	.089	.115
bbls, c-l, spot ... lb.	.09	.092	.085	.092	.081	.102
Tks ... lb.	.084	.086	.079	.086	.07½	.096
Menhaden, tks, Baltimore gal.	.32	nom.	.30	.32	.34½	.37½
Refined, alkali, drs ... lb.	...	.072	.072	.077	.067	.095
Tks ... lb.	...	.066	.066	.071	.061	.087
Kettle bodied, drs ... lb.	...	.082	.082	.088	.076	.105
Light pressed, drs ... lb.	...	.066	.066	.071	.061	.091
Tks ... lb.	...	.06	.06	.065	.05½	.08
Neatsfoot, CT, 20°, bbls, NY lb.	...	.15¼	...	.15¼	.15¼	.17¼
Extra, bbls, NY ... lb.	...	.09⅛	.09	.09¼	.08⅝	.10
Pure, bbls, NY ... lb.	...	.12	.10¾	.12	.10¾	.12¼
Oiticica, bbls ... lb.	.11½	.12½	.09¼	.12½	.09¼	.12¾
Oleo, No. 1, bbls, NY ... lb.	...	.08	.07¾	.08¾	.08½	.10½
No. 2, bbls, NY ... lb.	...	.07½	.07	.08	.08	.10
Olive, denat, bbls, NY ... gal.	.83	.84	.83	.93	.86	1.20
Edible, bbls, NY ... gal.	1.75	2.00	1.75	2.00	1.75	2.35
Foots, bbls, NY ... lb.	.07	.07⅛	.06⅞	.07¼	.07	.09⅞
Palm, Kernel, bulk ... lb.	...	.036	.0340	.036	.0325	.04½
Niger, cks ... lb.	.03¾	.03⅞	.03⅝	.03⅞	...	...
Sumatra, tks ... lb.	...	.0270	.0270	.02¾	.02⅝	.0375
Peanut, crude, bbls, NY lb.	...	.06	.06	.07	.07	.08¼
Tks, f.o.b. mill ... lb	.05¾	.05⅞	.05¾	.06⅝	.06⅝	.08
Refined, bbls, NY ... lb.	.08⅞	.09¼	.09¼	.10	.09¾	.10¾
Perilla, drs, NY ... lb	.09⅝	.09¾	.09½	.09¾	.09¾	.11¾
Tks, Coast ... lb	.091	.092	.089	.0925	.09	.11
Pine, see Pine Oil, Chemical Section.						
Rapeseed, blown, bbls, NY lb.	.14	.14½	.14	.14½	.14	.14¾
Denatured, drs, NY ... gal	.80	.82	.80	.82	.75	.91
Red, Distilled, bbls ... lb.	.07⅜	.08⅛	.07⅜	.08⅛	.07⅜	.10⅝
Tks ... lb.	.06½	.07½	.06½	.07½	.06½	.09¾
Sardine, Pac Coast, tks ... gal	.33	.34	.28½	.34	.28	.46½
Refined alkali, drs ... lb.	...	.072	.072	.077	.067	.095
Tks ... lb	...	.066	.066	.071	.061	.087
Light pressed, drs ... lb.	...	.066	.066	.071	.061	.089
Tks ... lb.	...	.06	.06	.065	.05½	.08
Sesame, yellow, dom ... lb.	.09⅛	.09¼	.09	.10½	.10¼	.10½
White, dom ... lb.	.09⅛	.09¼	.09	.10½	.10¼	.10½
Soy Bean, crude						
Dom, tks, f.o.b. mills lb	...	.055	.055	.05¾	.05⅞	.07
Crude, drs, NY ... lb	.061	.065	.061	.065	.06½	.08
Ref'd, drs, NY ... lb.	.073	.077	.073	.077	.07⅝	.097
Tks ... lb.	...	.067	.067	.0675	.0685	.082
Sperm, 38° CT, bleached bbls NY ... lb.	.09	.092	.09	.10	.10	.102
45° CT, bleached, bbls, NY ... lb.	.083	.085	.083	.093	.093	.095
Stearic Acid, double pressed dist bgs ... lb.	.10½	.11½	.10½	.11½	.10	.12
Double pressed saponified bgs ... lb	.10¾	.11¾	.10¼	.11¾	.10¼	.12¼
Triple pressed dist bgs lb.	.13½	.14½	.13	.14½	.13	.15
Stearine, Oleo, bbls ... lb.	.05¾	.06	.05¾	.06¾	.05½	.08½
Tallow City, extra loose ... lb.	...	.05⅜	.05⅛	.05⅜	.04¾	.06⅜
Edible, tierces ... lb	.05½	nom.	.05½	.06	.06	.07⅝
Acidless, tks, NY ... lb	...	.08	.08	.08¼	.07¾	.09¼
Turkey Red, single, drs ... lb.	.06	.07	.06	.08⅝	.06¼	.08½
Double, bbls ... lb	.08¾	.09¾	.08¾	.10⅞	.09½	.13
Whale:						
Winter bleach, bbls, NY lb.	.081	.083	.081	.083	.081	.10
Refined, nat, bbls, NY ... lb	.077	.079	.077	.079	.077	.096

Help Wanted

Business Opportunities

Machinery For Sale

Formulas

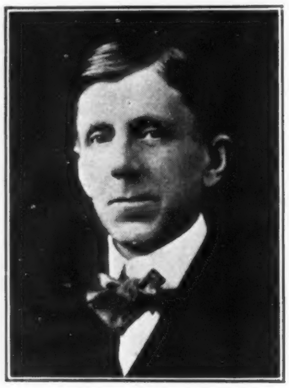
Patents

Index to Advertisers

Index to Advertisers

"We"—Editorially Speaking

Dr. James Bert Garner, author of this month's "Creating Industries Series" article (Natural Gas, 1919-1939, page 624) was born at Lebanon, Ind., on Sept. 2, 1870. He received his B.Sc. from Wabash in 1893, his M.Sc. in '95, and his Ph.D., magma cum laude, at the University of Chicago in 1897. He taught chemistry at Bradley "Poly" and Wabash in the years 1897-1914, becoming in the latter year a fellow at Mellon Institute. Since 1915 he has been director of Natural Gas Investigations at Mellon. Dr. Garner is a director of the Utility Survey Commission of Greater Pittsburgh, and a former director of research on gas, oil and coal for Hope and Peoples Natural Gas Companies, subsidiaries of Standard Oil of N. J. The gas mask which he invented in 1915 was adopted by the British Government and the U. S. Army in the World War. He is married and is a 32nd degree Mason. He is a Fellow, A.A.A.S., a member of the A.C.S., Natural Gas Association of America, Phi Delta Theta, Phi Beta Kappa, Alpha Chi Sigma, Phi Sigma, and Sigma Psi.



Dr. E. M. Frankel, author of Chemicals in the Paper Industry, page 619, received his preliminary education at the College of the City of New York, and at the University of Pennsylvania, and was granted his Doctor's degree by Yale in '16. He has been engaged in scientific research and development since his undergraduate days, having made his debut before the A.C.S. in 1911.

During his commercial career he has been connected with the manufacture of fine synthetic organic chemicals such as salicylic acid, aspirin, triphenyl phosphate, and glycerol triacetate. Starting with experimental work on the utilization of sulfite waste liquor, he later entered the alcohol business with the Publicker Commercial Alcohol Co., of Philadelphia.

During the succeeding years, he operated his own plant, manufacturing and selling chemicals to the plastics industry, and, as an outgrowth of this business, became associated with E. F. Drew & Co., refiners of vegetable oils and manufacturers of products derived from these. In 1928 he joined West Virginia Pulp & Paper, with which concern he continued as director of the Research Laboratory until 1935, (and with which he is still consultant) when he was appointed technical director of Oldetyme Distillers, Inc., in the production and distribution of whiskeys, gins, etc.

C. H. Beek, in charge of Calco Chemical's Department of Training, and who is the author of the article "Calco Foremen Training Courses," page 641, received his B.S. from Bates and his M.A. from Columbia. He has had over 20 years of experience in the field of education in elementary and secondary schools. He is a former president of the N. J. State Junior High School Association, also a former president of the N. J. State Secondary School Association. Mr. Beek received a few years back the Silver Beaver Award from the National Boy Scout Association for his "Service to Boyhood." His work at Calco started in December, '36.

Fifteen Years Ago

From our issues of June, 1924

C. C. Concannon, chief, Chemical Division, U. S. Bureau of Foreign and Domestic Commerce, addresses the annual meeting of the M. C. A. in N. Y. City; points out the South American markets as ripe field for American endeavor.

C. C. Speiden of Innis, Speiden, & Co., N. Y. City, heavy chemicals, returns recently from a two months' trip to Europe.

Among the speakers at the annual dinner of the Drexel Institute Chemical Society, held at Hotel Sylvania, Philadelphia, was Dr. J. G. Vail, chemical director, Philadelphia Quartz.

"The George Dunningites" defeat the "Doc Dorlandites" at baseball, at Centreport, L. I., with "Cline" McKenna hitting a homerun. "Johnny" Chew elected chairman of the nominating committee of the Salesmen's Association.

Grasselli Dyestuff Corp. is organized to take over dyestuff properties of Grasselli Chemical Co.

Peters, White & Co., 50 years old, is absorbed by Parsons & Petit —Sumner W. White retires from business.

Metz and Grasselli deny sale of dye plants to German cartel.

Butterworth- Judson Corp., heavy chemicals and intermediates, closes N. Y. City office.

One day a week or so ago it happened to be Dr. J. F. X. Harold's turn to be the recipient of the usual kidding at the "high roundtable" at the Chemists' Club and after a particularly pertinent remark by a well-known patent attorney Dr. Harold retorted:—

"Sir! Let me tell you I am the guy the man you hope to be thinks he is."

It has been said that the only difference between pure and applied research is twenty-five years.

We are so enthusiastic about several of the coming features that we just can't help but let you in on some of the details. Dr. T. P. Morgan's article—"Chemical Finances, 1919-1939," will appear in the July issue. Dr. Morgan is the well-known economist with the firm of Scudder, Stevens, and Clark, N. Y. City. When we read his manuscript we were utterly amazed at its scope even though we are thoroughly familiar with the high standard he always sets for himself. "Tantalum In The Chemical Industry," by F. L. Hunter, chief engineer of the tantalum division of Fansteel Metallurgical, will be another July feature. A month or so ago R. H. Leach, vice-president and director of research of Handy & Harman, stopped by and delivered into our hands his manuscript on "Silver As a Chemical Raw Material." This is the most complete discussion of the metal that we have ever seen and will appear in an early issue. "On the fire" are articles on sodium tetraphosphate and the nitroparaffins. C. L. Gabriel, of Commercial Solvents, tells us that the latter will be ready in time for our August issue. Believe us when we say that only lack of space prevents us from telling you about several more outstanding features that you will soon be reading.

VOL. 44
June '39

CHEMICAL INDUSTRIES

Statistical and Technical Data Section

No. 6
Part 2

State of Chemical Trade

Current Statistics (May 31, 1939)—p. 35

WEEKLY STATISTICS OF BUSINESS

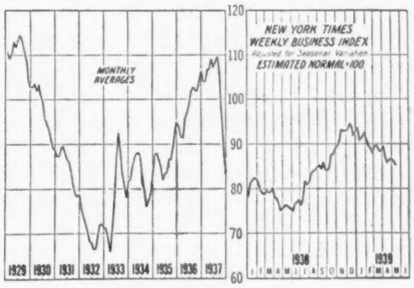
Week Ending	Carloadings 1939	Carloadings 1938	Carloadings % of Change	Electrical Output* 1939	Electrical Output* 1938	Electrical Output* % of Change	Jour. of Com. Price Index	Nat'l Fertilizer Ass'n Price Indices: Chem. & Drugs	Fats & Oils	Fert. Mat.	Mixed Fert.	All Groups	†Labor Dept. Chem. & Drug Price Index	% Steel Activity	N. Y. Times Index Bus. Act.	Fisher Commodity Index
April 29	586,015	543,089	+ 7.9	2,182,727	1,938,660	+12.6	74.9	91.9	49.9	71.3	77.3	72.4	75.8	48.5	86.7	124.9
May 6	572,857	536,149	+ 6.8	2,163,538	1,939,100	+11.6	75.2	91.9	50.5	71.4	77.3	72.7	75.7	49.0	86.3	125.1
May 13	555,396	541,808	+ 2.5	2,170,750	1,967,613	+10.3	74.7	91.9	50.3	71.3	77.3	72.4	75.7	47.0	85.3	125.1
May 20	615,966	545,789	+12.8	2,170,496	1,967,807	+10.3	75.2	91.9	49.4	71.3	77.2	72.4	75.7	45.5	86.1	125.4
May 27	627,674	562,076	+11.5	....	....	.....	75.5	91.9	49.8	71.3	77.2	72.3	...	49.0	97.0	125.4

*K.W.H., 000 omitted †1926-1928 = 100.0.

MONTHLY STATISTICS

	April 1939	April 1938	March 1939	March 1938	Februarv 1939	February 1938
CHEMICAL:						
Acid, sulfuric (expressed as 50° Baumé, short tons, Bureau of the Census)						
Total prod. by fert. mfrs.	......	143,469	169,962	154,379	169,769	159,659
Consumpt. in mfr. fert.	......	110,496	119,081	129,233	138,273	125,294
Stocks end of month	......	93,494	94,529	93,319	92,163	89,857
Alcohol, Industrial (Bureau Internal Revenue)						
Ethyl alcohol prod., proof gal..	17,858,504	12,816,786	17,422,863	18,305,610	14,670,621	16,765,189
Comp. denat. prod., wine gal...	240,918	297,743	504,866	130,577	339,341	154,360
Removed, wine gal.	184,319	300,348	480,383	121,517	361,308	151,154
Stocks end of mo., wine gal. ..	518,723	546,055	456,115	549,026	432,643	540,247
Spec. denat. prod., wine gal. ...	7,477,590	5,988,829	7,110,717	6,076,362	6,114,708	4,933,550
Removed, wine gal.	7,338,848	6,063,358	7,097,752	6,048,474	6,205,409	4,845,062
Stocks end of mo., wine gal...	973,027	581,247	847,794	663,519	827,844	638,598
Ammonia sulfate prod., tons *a*..	39,634.5	34,342	46,669	36,134	41,780	32,959
Benzol prod., gal. *b*	6,873,000	5,385,000	8,063,000	5,998,000	7,141,000	5,575,000
Byproduct coke, prod., tons *a*..	2,914,660	2,436,264	3,438,537	2,675,071	3,077,854	2,493,586
Cellulose Plastic Products (Bureau of the Census)						
Nitrocellulose sheets, prod., lbs.	802,067	453,596	917,274	481,134	712,212	444,871
Sheets, ship., lbs.	663,460	525,132	818,229	607,496	698,393	492,087
Rods, prod., lbs.	255,918	199,119	311,893	214,784	267,790	185,607
Rods, ship., lbs.	238,098	201,392	290,064	263,186	230,625	183,112
Tubes, prod., lbs.	58,420	37,989	85,841	57,994	69,293	44,372
Tubes, ship., lbs.	48,521	51,179	62,749	73,396	48,273	40,859
Cellulose acetate, sheets, rod, tubes						
Production, lbs.	508,264	249,185	1,077,560	168,073	988,719	337,938
Shipments, lbs.	522,346	259,209	1,029,302	202,715	1,014,295	288,761
Molding comp., ship.; lbs.....	599,609	433,487	809,718	446,689	770,006	423,644
Methanol (Bureau of the Census)						
Production, crude, gals.	389,423	314,664	364,500	432,800	336,157	408,930
Production, synthetic, gals. ...	2,276,385	1,975,999	2,406,564	2,343,828	2,267,339	2,290,609
Pyroxylin-Coated Textiles (Bureau of the Census)						
Light goods, ship., linear yds...	......	......	3,108,289	2,829,145	3,005,939	2,575,661
Heavy goods, ship., linear yds...	......	......	2,396,423	1,858,869	2,113,036	1,511,615
Pyroxylin spreads, lbs. *c*......	......	......	5,401,941	4,831,049	5,079,315	4,258,768
Exports (Bureau of Foreign & Dom. Commerce)						
Chemicals and related prod. *d*..	......	......	......	$11,560	$9,890	$8,784
Crude sulfur *d*	......	......	$756	$717	$575	$921
Coal-tar chemicals *d*	......	......	$961	$1,047	$876	$539
Industrial chemicals *d*	......	......	$2,261	$2,136	$1,799	$1,810
Imports						
Chemicals and related prod. *d*..	......	......	......	$7,804	$6,099	$6,120
Coal-tar chemicals *d*	......	......	$1,122	$960	$1,794	$1,270
Industrial chemicals *d*	......	......	$1,459	$1,766	$1,147	$1,014
Payrolls (U. S. Dept. of Labor, 3 year av., 1923-25 = 100)						
Chemicals and allied prod., including petroleum	120.2	114.3	121.6	117.3	119.8	117.3
Other than petroleum	117.9	108.0	118.6	111.3	116.0	110.8
Chemicals	127.9	117.4	130.9	118.5	129.6	123.6
Explosives	89.6	83.8	91.5	88.1	91.9	90.0
Employment (U. S. Dept. of Labor, 3 year av., 1923-25 = 100)						
Chemicals and allied prod., including petroleum	114.8	112.4	114.4	115.1	112.1	115.1
Other than petroleum	114.5	110.2	114.0	113.6	111.1	113.4
Chemicals	114.9	111.4	116.5	113.4	116.1	117.3
Explosives	80.8	81.4	81.3	82.5	80.2	82.4
Price index chemicals	79.3	81.9	79.9	83.2	79.4	83.6
Chem. and drugs	76.0	77.5	76.5	78.7	76.3	79.1
Fert. mat.	69.6	70.1	69.7	71.8	69.3	72.3
FERTILIZER:						
Exports (long tons, Nat. Fert. Association)						
Fertilizer and fert. materials...	......	......	123,687	172,296	85,095	122,456
Ammonium sulfate	......	......	1,199	686	437	78
Total phosphate rock	......	......	90,738	131,830	62,068	104,251
Total potash fertilizers	......	......	17,102	7,031	2,132	8,134
Imports (long tons, Nat. Fert. Association)						
Fertilizer and fert. materials ..	......	......	142,430	189,265	110,847	159,506
Ammonium sulfate	......	......	14,179	10,204	6,746	10,883
Sodium nitrate	......	......	42,920	91,426	54,552	68,755
Total potash fertiliser	......	......	17,235	22,322	6,795	22,534

INDUSTRIAL TRENDS



Business: A turn for the better was reported in the last 10 days of May and, with it, a distinct improvement in business sentiment. All indices of business activity turned upward in the middle of the month. The likelihood of war abroad seems more remote and there is a general feeling that such a disaster will not occur until after the crops are in, if at all. Each day that war is avoided the less possibility there is that a holocaust will break out.

Steel: With the fear of a coal shortage out of the way, activity has shown definite gains. Sizable tonnage has been placed and further gains may take place, even though the automotive field probably will curtail operations in the near future.

Automotive: Labor trouble in the Detroit area caused a drop in the number of units produced in May. Further decline is expected through June and July.

Retail Trade: Average retail volume for the whole country is estimated to be between 6% and 12% higher than during the corresponding period of last year.

Wholesale Trade: An improved tone was in evidence throughout the last part of May. Retailers are currently showing more desire to place sizable orders. Retailers in the N. Y. Metropolitan area report that they are now beginning to feel the influx of World's Fair trade.

Textiles: The expected additional curtailment of operations in the cotton cloth mills seems to have been postponed somewhat and the outlook now is better than it was even 10 days ago. The higher prices for silk are proving to be an aid to rayon manufacturers. A fairly satisfactory amount of woolen goods is on the books for this time of the year.

State of Chemical Trade
Current Statistics (May 31, 1939)—p. 35

State of Chemical Trade

Current Statistics (May 31, 1939) p. 36

Glass: Construction gains indicate a favorable outlook. A seasonal let-down in safety glass appears certain.

Rubber: Akron tire factories are reducing output in view of the approach of the seasonal slack period in automotive production. With the introduction of next season's models scheduled earlier than last year, the drop is likely to occur shortly. Replacement tire sales are very satisfactory.

Paper: The industry was unable, in the first quarter of '39, to improve its performance over the corresponding period of a year previously, although some members of the industry were able to make a better showing, a recently made survey of the *N. Y. Times* indicates. A more bullish feeling over the prospects for the balance of this year was in evidence in trade circles.

Commodity Prices: Most indices showed further losses in the past month and prices generally are below the corresponding period a year ago. In many quarters it is held that with the prospect of better business much brighter, some stiffening of the price structure of raw materials is inevitable.

Coatings: Paint sales show sizeable increases over the corresponding period of last year. Coatings for industrial purposes were in good demand in May, but some slackening is anticipated in June and with further curtailment in July and August. Volume, however, is expected to exceed the same months a year ago.

Carloadings: Weekly figures are ahead of the same weeks of '38, but are well below the totals for '37.

Construction: Engineering construction awards are running far in excess of the same period of '38.

Electric Energy: Production for the week of May 20 was 10.3% ahead of the corresponding week of '38.

Outlook: Within the last few weeks optimism has unexpectedly developed and the belief is now generally held that the stage is set for a general business improvement in the second half of '39, unless new disturbing elements, now unforeseen, arise. The gains that are now confidently looked for were held in abeyance when the foreign situation became highly acute last March. While the Washington situation still looks muddled, there is again some small ray of hope that some relief in the way of burdensome taxation and certain corrections or modifications of the Wagner Act, the Hours and Wages Act, etc., will be made by the present session of Congress. Business men, however, are more than likely to move with caution until more definite assurances are made by Congress.

MONTHLY STATISTICS (cont'd)

FERTILIZER: (Cont'd)	April 1939	April 1938	March 1939	March 1938	February 1939	February 1938
Superphosphate e (Nat. Fert. Association)						
Production, bulk	......	......	245.007	257.595	263,518	251,999
Shipments, total	......	......	607,094	664.739	250,568	278,511
Northern area	......	......	184,525	235.742	86.467	98.542
Southern area	......	......	422,569	428,997	173,101	179.969
Stocks, end of month, total	......	......	1,615,376	1,670,877	1,117,132	1,165,121
Tag Sales (short tons, Nat. Fert. Association)						
Total, 17 states	1,315,134	167,985	1,581,205	1,587,602	684,765	752,388
Total, 12 southern	1,271,077	1,039,745	1,478,041	1,515,334	628,996	693,855
Total, 5 midwest	44,057	68,240	103,164	72,268	55,769	58,533
Fertilizer payrolls	133.8	118.8	105.6	109.2	77.2	87.0
Fertilizer employment	159.4	136.3	132.2	129.5	98.2	104.2
Value imports, fert. and mat. *d*	......	......	$3.291	$4,261	$2,417	$3,206
GENERAL:						
Acceptances outst'd'g *f*	$237	$278	$245	$292	$248	$307
Coal prod., anthracite, tons	5,227,000	3,138,000	3,604,000	3,467,048	3,056,728	3,056,728
Coal prod., bituminous, tons	10,747,000	21,671,000	35,290,000	26,745,000	......	27,000,000
Com. paper outst'd'g *f*	$191	$271	$191	$296	$195	$292
Failures, Dun & Bradstreet	1,140	1,172	1,123	1,167	963	1,149
Factory payrolls *i*	85.0	74.6	86.8	73.3	85.3	76.9
Factory employment *i*	91.3	85.7	91.3	81.7	90.7	88.2
Merchandise imports *i*	......	......	$190,416	$173,372	$158,035	$163,085
Merchandise exports *i*	......	......	$268,364	$275,308	$218,559	$262,733
GENERAL MANUFACTURING:						
Automotive production	337,372	219,310	371,940	221,795	297,841	186,806
Boot and shoe prod., pairs	32,475.009	33,467,918	42,375,490	37,542,928	35,157,015	29,767,420
Bldg. contracts, Dodge *j*	$330,030	$222,016	$300,661	$226,918	$220,197	$118,945
Newsprint prod., U. S. tons	77,393	58,836	79,929	67,864	70,868	61,357
Newsprint prod., Canada, tons.	220,843	200,794	220,648	224,604	200,631	202,601
Glass Containers, gross *d*	4,071	3,647	4,128	3,637	3,389	2,995
Plate glass prod., sq. ft.	7,268,068	3,819,735	11,866,817	3,802,111	10,165,401	2,663,835
Window glass prod., boxes	738,951	341,014	912,301	528,032	808,585	......
Steel ingot prod., tons	2,986,985	1,919,042	3,396,021	2,004,204	2,982,011	1,697,452
% steel capacity	......	33.44	55.63	33.85	......	31.73
Pig iron prod., tons	2,033.259	1,376,141	2,394.615	1,452,487	2,060,187	1,298,268
U. S. consumpt. crude rub., tons	......	27,984	50,165	30,487	42,365	23,868
Tire shipments	......	......	4,582,655	2,794,956	3,738,696	2,290,800
Tire production	......	......	5,137,030	2,679,735	4,343,513	2,155,798
Tire inventories	......	......	10,108,584	10,520,813	9,572,553	10,559,277
Cotton consumpt., bales	......	414,392	649,237	512,626	562,293	426,866
Cotton spindles oper.	22,109,394	21,786,054	22,472,330	22,288,098	22,524,742	22,346.736
Silk deliveries, bales	21,802	33,381	37,863	34,884	33,219	30,260
Wool Consumption *z*	......	......	35.2	......	31.2	16.1
Rayon deliv., lbs.	23,100,000	......	26,500,000	18,300.000	25,600,000	16,800,000
Hosiery (all kinds) *t*	......	......	10,433,355	8,000,059	8,904.629	6,665,330
Rayon employment *i*	315.7	283.0	317.3	312.1	319.1	307.3
Rayon payrolls *i*	304.8	244.2	313.9	281.7	314.4	265.8
Soap employment *i*	88.4	86.9	90.5	89.0	89.7	82.2
Soap payrolls *i*	91.2	87.0	92.5	89.7	91.2	89.2
Paper and pulp employment *i*.	106.4	104.3	106.1	105.4	106.3	106.0
Paper and pulp payrolls *i*	104.7	98.4	105.5	101.8	105.1	101.8
Leather employment	94.3	92.1	97.6	94.2	96.6	93.5
Leather payrolls *i*	75.0	70.6	83.2	76.6	83.3	77.0
Glass employment *i*	91.5	81.6	90.6	83.5	89.5	85.4
Glass payrolls *i*	90.7	77.6	95.3	81.4	93.3	80.7
Rubber prod. employment *i*	81.7	72.7	82.8	72.9	81.3	74.1
Rubber prod. payrolls *i*	83.0	61.9	85.4	60.9	82.8	68.9
Dyeing and fin. employment *i*.	114.0	103.6	116.0	105.2	116.6	105.1
Dyeing and fin. payrolls *i*	96.4	86.1	101.0	89.1	102.0	89.7
MISCELLANEOUS:						
Oils & Fats Index ('26 = 100)	......	......	55.3	......	54.7	89.7
Gasoline prod., bbls.	......	......	......	......	......	......
Cottonseed oil consumpt., bbls.	......	......	307,053	361,218	217,781	428,531
PAINT, VARNISH, LACQUER, FILLERS:						
Sales 680 establishments	......	......	$32,888,357	$30,728,890	$25,399,464	$22,625,906
Trade sales (580 establishments)	......	......	$17,656,995	$17,227,950	$13,145,314	$12,535,636
Industrial sales, total	......	......	$12,112,220	$10,417,161	$10,019,901	$7,942,419
Paint & Varnish, employ. *i*	117.6	114.2	114.9	113.5	112.5	112.2
Paint & Varnish, payrolls *i*	123.4	114.1	120.4	110.8	115.7	108.1
Paint & Varnish, exports *d*	......	......	$599	$770	$602	$586

a Bureau of Mines; *b* Crude and refined plus motor benzol, Bureau of Mines; *c* Based on 1 lb. of gun cotton to 7 lbs. of solvent, making an 8-lb. jelly; *d* 000 omitted, Bureau of Foreign & Domestic Commerce; *e* Expressed in equivalent tons of 16% A.P.A.; *f* 000,000 omitted at end of month; *i* U. S. Dept. of Labor, 3 year average, 1923-25 = 100; *j* 000 omitted, 37 states; *p* Rayon Organon, formerly an index was given, now the exact poundage is given; *q* 680 establishments, Bureau of the Census; *r* Classified sales, 580 establishments, Bureau of the Census; *s* 53 manufacturers, Bureau of the Census; *t* 381 identical manufacturers, Bureau of the Census, quantity expressed in dozen pairs; *v* In thousands of bbls., Bureau of the Census; ** Indices, Survey of Current Business, U. S. Dept. of Commerce; *z* Units are millions of lbs.

Earnings Statements

Report of Certain-Teed Products Corp. and wholly-owned subsidiaries for quarter ended Mar. 31, shows net loss of $148,659 after depreciation, depletion, interest, and Federal income taxes, compared with net loss of $189,588 in March quarter of previous year. Statement does not include earnings of Sloane-Blabon Corp.

Amer. I. G.'s Report

Report of American I. G. Chemical Corp., for fiscal year ended March 31, 1939, certified by independent auditors, shows net income of $3,223,792 including $1,172,672 net profit on sale of securities, and after interest, Federal income taxes and other deductions, equal under the participating provisions of the shares, to $4.03 a share on 500,938 no-par shares of Class A common stock and 40 cents a share on 3,000,000 shares (par $1) of Class B common stock.

This compares with net income in preceding year of $4,186,110, including $502,291 net profit on sale of securities, equal to $5.26 a share on 495,448 shares of Class A common stock and 52 cents a share on 3,000,000 shares of Class B common stock.

Directors have agreed to the funding of advances of the corporation to its subsidiaries, amounting as of March 31, to $9,500,000, by acceptance of preferred stock of Agfa Ansco Corp. and of common stock of General Aniline Works, Inc. Agfa Ansco will issue to the parent company $5,000,000 in 4½% preferred.

Buys Wall Chemicals

Liquid Carbonic Corp. has completed plans to take over the assets and business of Wall Chemicals, Inc., manufacturer of oxygen, acetylene and other compressed gases. Mr. Wall, active in this field for over 15 years, remains as president of the new subsidiary.

Price Trend of Representative Chemical Company Stocks

	April 29	May 6	May 13	May 20	May 27	May 31	Net gain or loss last mo.	Price on May 31, 1938	1939 High	1939 Low
Air Reduction	49¼	49⅝	49½	48½	53	53¼	+ 4	43	65⅝	45¼
Allied Chemical	157½	161	161½	159¾	166½	167	+ 9½	137½	193	151½
Am. Cyanamid "B"	20½	22⅜	23	22¼	23⅜	23½	+ 3	15¾	28⅜	18⅜
Am. Agric. Chem.	16	16⅜	16½	16¾	18	18⅜	+ 2⅜	....	24¼	16
Columbian Carbon	78½	81	81	82	90	88	+ 9½	66½	93	73
Commercial Solvents	9⅞	10½	10½	10½	11	11¼	+ 1⅜	6⅛	13¾	9⅝
Dow Chemical	114½	113	115	114⅝	114½	115½	+ 1	93½	135	101½
du Pont	140	142¼	143½	144⅜	146⅛	147	+ 7	92½	156¾	126¼
Hercules Powder	64⅞	65⅞	66½	67	69	70½	+ 5⅝	....	86	63
Mathieson Alkali	26	25¾	24	25	26	26¼	+ ¼	21½	36	23
Monsanto Chemical	91½	96½	98	95¾	98½	97	+ 5½	70	111	85¾
Std. of N. J.	45	46½	46½	43¼	44¾	44½	— ½	44⅜	53¼	41⅞
Texas Gulf Sulphur	28⅛	28	28¼	27⅝	29¼	29	+ ⅞	28½	32⅝	26¼
Union Carbide	72¼	74½	74¾	73⅝	75	76¼	+ 4	60⅝	90½	65½
U. S. Ind. Alcohol	15	15¾	15⅜	15¼	16½	17½	+ 2½	15¼	25¾	13½

Earnings Statements Summarized

Company:	Annual dividends	Net income 1939	Net income 1938	Common share earnings 1939	Common share earnings 1938	Surplus after dividends 1939	Surplus after dividends 1938
American Commercial Alcohol:							
March 31 quarter	f	$49,305	$59,144	$.09	$.12	......	......
Anaconda Copper Mining Co.:							
March 31 quarter	y$.50	3,686,911	2,385,516	.42	.27	......	......
Archer-Daniels-Midland Co.:							
††March 31 quarter	y1.00	401,089	197,669	.64	.27	......	......
Nine months, March 31	y1.00	826,197	873,786	1.23	1.31	......	......
Celanese Corp. of Amer.:							
March 31 quarter	f	1,336,714	114,274	.71	r.69	......	......
Twelve months, March 31	f	3,702,215	2,826,648	1.36	.57	......	......
Certain-teed Products Corp.:							
March 31 quarter	f	†148,659	†189,588	...	...	......	......
Compressed Industrial Gases:							
March 31 quarter	f	46,668	8,146	.18	.03	......	......
Consolidated Chemical Industries, Inc.:							
March 31 quarter	f	102,785	101,858	a.37	b.15	......	......
Glidden Co.:							
Six months, April 30	f	366,147	12,571	.17	p.06	......	......
National Oil Products Co.:							
March 31 quarter	y.95	182,950	81,361	1.02	.47	......	......
Paraffine Companies, Inc.:							
March 31 quarter	2.00	336,398	117,459	.66	.20	......	......
Nine months, March 31	2.00	1,037,061	1,016,190	2.03	1.99	......	......
Sharp & Dohme, Inc.:							
March 31 quarter	f	182,026	173,936	p.79	p.76	......	......
Staley (A. E.) Mfg. Co.:							
March 31 quarter	y.30	427,452	332,127	...	...	......	......
Tubize Chatillon Corp.:							
March 31 quarter	f	180,458	†31,947	s1.00	...	......	......
United Carbon Co.:							
March 31 quarter	y3.00	459,202	438,364	1.15	1.10	$160,788	$40,479
Vulcan Detinning Co.:							
March 31 quarter	w2.50	98,889	44,132	2.34	.64	......	......
West Virginia Pulp & Paper Co.:							
Six months, April 30	y.20	563,011	300,228	.10	p1.93	......	......

†Net loss; *a* On Class A shares; *b* On Class B shares; *f* No common dividend; *h* On shares outstanding at close of respective periods; *p* On preferred stock; *r* On first preferred stock; *s* On second preferred stock; *w* Last dividend declared; period not announced by company; *y* Amount paid or payable in 12 months to and including the payable date of the most recent dividend announcement; ††Indicated quarterly earnings as shown by comparison of company's reports for the 6 and 9 months periods.

Dividends and Dates

Name	Div.	Stock Record	Payable
Abbott Labs., E	10c	June 13	June 30
Abbott Labs., q.	40c	June 13	June 30
Abbott Labs, pf., q.	$1.12½	July 1	July 15
Atlas Powder	50c	May 31	June 10
Archer-Daniels-Midland	25c	May 20	June 1
Borne-Scrymser Co.	$1.00	May 25	June 15
Carman & Co., Cl. A, Ac.	50c	May 15	June 1
Colgate-Palmolive-Peet, pf., q.	$1.50	June 6	July 1
Columbian Carbon, q.	$1.00	May 19	June 10
Cook Paint & Varnish, q.	15c	May 25	June 1
Cook Paint & Varnish, pf., q.	$1.00	May 25	June 1
Du Pont, i	$1.25	May 22	June 1
Du Pont, pf., q.	$1.12½	July 10	July 25
Du Pont, deb. q.	$1.50	July 10	July 25
Eastman Kodak, q.	$1.50	June 5	July 1
Eastman Kodak, pf., q.	$1.50	June 5	July 1
Freeport Sulphur q.	25c	May 16	June 1
Glidden Co., pf. q.	56¼c	June 16	July 1
Heyden Chemical	40c	May 23	June 1
Imp'l Chemical Ind., f.	5%	Apr. 20	June 8
International Salt, q.	37½c	June 15	July 1
International Nickel of Canada	50c	May 31	June 30
Lindsay Light & Chemical	10c	May 6	May 29
Liquid Carbonic	20c	June 15	July 1
Mathieson Alkali, q.	37½	June 8	June 30
Mathieson Alkali, pf. q.	$1.75	June 8	June 30
Merck & Co.	25c	June 19	July 1
Merck & Co., pf. q.	$1.50	June 19	July 1
Monsanto Chemical, q.	50c	June 1	June 15
Monsanto Chemical, pf., A, s.	$2.25	Nov. 10	Dec. 1
Monsanto Chemical, pf., B, s.	$2.25	Nov. 10	Dec. 1
Monsanto Chemical, pf., s.	$2.25	May 10	June 1
Monsanto Chemical, pf., B, i	$2.09	May 10	June 1
National Lead	12½c	June 16	June 30
National Lead, Cl. B, pf., q.	$1.50	July 21	Aug. 1
National Lead, pf., A, q.	$1.75	June 2	June 15
National Oil Prod., i	25c	June 20	June 30
New Jersey Zinc	50c	May 20	June 10
Penick & Ford	75c	June 1	June 15
Penn. Salt Mfg. q.	$1.75	May 31	June 15
Pittsburgh Plate Glass	75c	June 10	July 1
Procter & Gamble, 5% pf., q.	$1.25	p	May 24
Pure Oil Co., 5% pf., q.	$1.25	June 9	July 1
Pure Oil Co., 5¼% pf.	$1.25	June 9	July 1
Pure Oil Co., 6% pf., q.	$1.50	June 9	July 1
St. Joseph Lead	25c	June 9	June 20
St. Joseph Lead	25c	Sept. 8	Sept. 20
Sherwin-Williams, pf., q.	$1.25	May 15	June 1
Southern Phosphate	15c	June 16	June 30
Spencer Kellogg	20c	May 25	June 9
Staley Mfg.	20c	June 10	June 20
Staley Mfg., $5 pf., q.	$1.25	June 10	June 20
Staley Mfg., 7% pf., s.	$3.50	June 20	July 1
Standard Oil of Indiana, q.	25c	May 15	June 15
Standard Oil of N. J., s.	50c	May 16	June 15
Standard Oil of N. J., stk.	b	May 16	June 15
Standard Wh'ls'le Phos. & Acid, q.	20c	May 20	June 15
Texas Gulf Sulphur, q.	50c	June 1	June 15
Union Carbide	50c	June 2	July 1
United Carbon, q.	75c	June 15	July 1
United Dyewood, pfd., q.	$1.75	June 9	July 1
Westvaco Chlorine, q.	25c	May 10	June 1

(Ac) accumulations; (b) stock dividend at the rate of 2 shares for each 200 shares held; (f) final; (i) interim; (p) payable as soon after June 1 as practicable; (s) semi-annual; (stk.) stock.

Chemical Finances
May 1939—p. 35

Chemical Finances
May 1939—p. 36

Chemical Stocks and Bonds

May 1939 Last	May 1939 High	May 1939 Low	1938 High	1938 Low	1937 High	1937 Low	Sales May 1939	Sales 1939	Stocks	Par $	Shares Listed	Dividends*	Earnings** $-per-share-$ 1938	1937	1936
NEW YORK STOCK EXCHANGE							Number of shares May 1939	1939							
61½	64¾	53	61	46¼	55	46	2,300	14,100	Abbott Labs.	No	640,000	$1.70	2.43	2.51	2.21
53¼	65⅜	45¼	67⅞	40	80¼	44½	17,000	90,700	Air Reduction	No	2,563,992	1.50	1.47	2.86	2.79
167	193	151½	197	124	258½	145	8,800	49,000	Allied Chem & Dye	No	2,214,099	6.00	5.92	11.19	11.44
18⅜	24¼	16	28½	22	33¾	17⅞	3,200	24,600	Amer. Agric. Chem	No	627,987	1.43	2.23	2.95	1.57
7½	11⅛	5¾	15	9	30¾	8¼	1,800	29,400	Amer. Com. Alcohol	No	260,930	....	—2.05	3.23	4.55
24¾	29½	21	31½	20	46	22	1,200	7,800	Archer-Dan.-Midland	No	545,416	1.25	.43	5.03	3.05
52	66¾	51	68	36	94	38	600	5,200	Atlas Powder Co.	No	249,163	2.25	2.69	4.40	4.21
117½	127	117½	126¼	105	133	101	180	1,290	5% conv. cum. pfd.	100	68,597	5.00	14.77	20.90	20.85
18⅞	24⅜	13⅝	26⅝	9	41¼	13	36,500	201,600	Celanese Corp. Amer.	No	1,000,000	....	.26	2.04	2.33
95	95	84	96	82	115	90	930	3,530	prior pfd.	100	164,818	7.00	15.05	27.07	27.25
15	16¼	11½	17	7⅛	25¾	8½	39,600	200,700	Colgate-Palm.-Peet	No	1,962,087	.25	1.77	—.35	1.40
104¾	105	101⅞	104¼	78	104½	95	900	7,800	6% pfd.	100	233,098	6.00	21.12	3.21	17.13
88	93	73	98½	53¾	125¾	65	2,800	16,300	Columbian Carbon	No	537,406	4.00	5.13	8.31	7.48
11¼	13¾	9⅜	12¼	5⅞	21¼	5	26,900	635,100	Commercial Solvents	No	2,636,878	....	—.11	.60	.85
63	66⅞	54⅞	70¾	53	71¼	50½	11,200	75,500	Corn Products	25	2,530,000	3.00	3.18	2.52	3.86
173¾	176¾	171	177	162	171½	153	600	3,200	7% cum. pfd.	100	245,738	7.00	39.69	32.96	46.76
26	32⅜	18⅛	40⅞	25	76⅛	29½	640	9,820	Devoe & Rayn. A.	No	95,000	2.00	—1.72	4.05	4.49
115½	135	101½	141	87⅞	159¼	79½	2,900	30,100	Dow Chemical	No	945,000	3.00	3.91	4.15	4.48
147	156¾	126¼	154¾	90½	180⅛	98	33,700	199,400	DuPont de Nemours	20	11,065,762	3.25	3.74	7.37	7.54
121	122	117½	120½	109½	112	107½	1,000	6,300	4½% pfd.	No	500,000	4.50	87.27	165.48	......
138	142	136⅜	138½	130¾	135½	130	4,500	16,200	6% cum. deb.	100	1,092,948	6.00	45.92	81.70	84.21
166¾	186⅛	138⅛	187	121½	198	144	26,700	134,300	Eastman Kodak	No	2,250,921	6.50	7.54	9.76	8.23
179	183½	175	173	157	164	150	430	1,250	6% cum.	100	61,657	6.00	281.22	362.45	306,64
20⅞	30	18¼	32	19⅞	32¼	18	2,800	59,600	Freeport Texas	10	796,380	2.00	1.87	3.30	2.43
8½	10⅞	7	12⅛	6¾	19	8½	4,400	61,200	Gen. Printing Ink	1	735,960	.50	.62	1.32	1.32
17½	24½	14¾	28½	13	51½	19⅛	6,800	65,100	Glidden Co.	No	829,989	.50	—.29	2.62	3.29
34	47	34	51½	37	58⅛	43	400	3,600	4½% cum. pfd.	50	199,940	2.25	1.03	12.72	15.43
106	106	93	111	76¾	117½	80⅛	1,500	7,100	Hazel Atlas	25	434,409	5.00	4.97	6.67	6.55
70½	86	63	87	42¾	92½	50	7,000	42,500	Hercules Powder	No	1,316,710	1.50	1.95	2.97	3.24
131½	135½	128½	135¼	126¾	135½	125	440	2,200	6% cum. pfd.	100	96,194	6.00	35.31	50.75	48.97
21	29½	16¾	30⅜	14⅜	47½	15	6,200	85,400	Industrial Rayon	No	759,325	.25	.24	.34	2.24
26	28½	17½	34½	15	64¼	20	4,900	26,100	Interchem.	No	289,618	....	.32	1.44	3.02
95	95	90	98	80	111½	92	440	2,940	6% pfd.	100	65,661	6.00	7.39	12.26	18.97
1¾	3⅛	1½	3⅞	2	9⅛	2	1,400	21,600	Intern. Agricul.	No	436,048	....	....	.16	—1.55
20	27⅝	16	29	15	63½	18¼	1,000	3,500	7% cum. pfd.	100	100,000	2.00	7.01	7.70	.23
49⅜	55¾	42¾	57⅝	36⅞	73⅜	37	65,400	577,600	Intern. Nickel	No	14,584.025	2.00	2.09	3.31	2.40
33	34	29	30¼	19½	28¾	19½	1,500	7,200	Intern. Salt	No	240,000	2.00	2.29	2.11	1.70
16½	21½	14½	24	19⅛	36	19¼	1,200	4,300	Kellogg (Spencer)	No	509,213	1.40	.71	2.81	2.62
48	56¾	36½	58⅜	23¼	79	33⅝	12,800	110,200	Libbey Owens Ford	No	2,509,750	1.25	1.57	4.19	4.14
15⅛	19	13¾	21½	12⅛	26⅞	14	5,200	37,800	Liquid Carbonic	No	700,000	1.25	1.81	2.37	1.58
26¼	36	23	36⅞	19¾	41¾	22	8,800	36,800	Mathieson Alkali	No	828,171	1.50	1.01	1.81	1.76
97	111	85¾	110	67	107½	71	7,000	49,300	Monsanto Chem.	No	1,241,816	2.00	2.35	4.40	4.01
122½	122½	115	117½	111	109	105	790	7,340	4½% pfds.	No	100,000	4.50	31.51	49.99	......
21⅝	27½	18½	31	17⅛	44	18	28,000	164,600	National Lead	10	3,095,100	.50	.75	.95	1.71
168	170	165	178½	154	171	153	300	2,100	7% cum, "A" pfd.	100	213,793	7.00	26.03	22.86	33.83
145	145	135	145½	127	150	127	280	2,880	6% cum. "B" pfd.	100	103,277	6.00	35.97	43.77	74.50
11⅞	17⅛	8½	19½	9⅞	41¾	10⅛	21,700	146,300	Newport Industries	1	621,359	....	—.08	2.22	.99
64	70	50	76¼	40	103¾	51¼	12,500	72,700	Owens-Illinois Glass	12.50	2,661,204	1.50	2.02	3.51	3.80
57⅛	57⅞	50⅝	59	39½	65½	43¼	22,900	83,900	Procter & Gamble	No	6,325,087	2.00	2.59	4.08	2.39
116½	119¾	112	122¼	114	118½	114½	2,060	10,190	5% pfd.	100	169,517	5.00	101.81	157.05	94.14
12¼	15⅛	10⅝	18⅜	10	34¾	14⅞	16,600	78,600	Shell Union Oil	No	13,070,625	.70	.70	1.44	1.35
106	107	101	106½	93	105⅜	91	2,900	10,100	5½% cum. pfd.	100	341,000	5.50	33.18	60.59	57.20
20⅜	29½	18½	34¾	18½	60⅝	26½	3,300	49,400	Skelly Oil	No	995,349	1.00	2.27	6.07	4.42
93	96	92	98	84	102¼	88	1,000	2,000	6% cum. pfd.	100	64,500	6.00	41.09	97.86	73.16
25⅝	29⅛	23¼	35½	24¾	50	26½	43,200	241,600	S. O. Indiana	25	15,272,020	1.00	1.82	3.16	3.09
44½	53¼	41⅞	58⅜	39¾	76	42	54,900	374,400	S. O. New Jersey	25	26,618,065	1.50	2.86	5.64	3.73
4⅞	6½	4	8	3⅞	15⅜	5¼	4,000	46,200	Tenn. Corp.	5	853,696	....	.46	1.09	.41
39⅝	48¼	35	49⅝	37⅝	65⅛	34¾	49,400	343,900	Texas Corp.	25	10,876,882	2.00	2.13	5.02	4.10
29	32⅝	26¼	38	26	44	23¾	7,700	103,200	Texas Gulf Sulphur	No	3,840,000	2.00	1.81	3.02	2.57
76¼	90½	65½	90⅞	57	111	61¼	46,500	252,500	Union Carbide & Carbon	No	9,073,288	2.40	2.77	4.81	4.09
58½	65¾	52	73½	39	91	36¾	1,500	21,300	United Carbon	No	397,885	3.25	3.78	5.91	5.54
17½	25¾	13½	30¼	13½	43⅝	16⅛	3,900	49,300	U. S. Indus. Alcohol	No	391,238	....	—1.08	1.24	—.20
21	30¼	16	28⅞	11½	39⅜	9¼	11,600	139,600	Vanadium Corp. Amer.	No	376,637	....	.61	2.22	.40
24	25⅞	18¼	25¼	13½	...	...	3,500	37,000	Victor Chem.	5	696,000	.90	1.05	1.01	1.16
3	4⅞	2½	5⅝	2¾	12¾	2⅛	2,000	41,300	Virginia-Caro. Chem.	No	486,122	....	—1.80	—.05	—2.44
22½	31⅞	17	32⅛	15¾	74⅜	18½	3,500	28,500	6% cum. part. pfd.	100	213,052	....	1.90	5.88	.44
19½	22½	15¼	20⅛	10	27¼	10¾	2,400	13,600	Westvaco Chlorine	No	339,362	1.00	1.52	1.46	1.17
30⅞	32⅛	29	31½	20	34⅞	21⅛	1,100	8,200	cum. pfd.	30	192,000	1.50	4.19	4.09	3.26
NEW YORK CURB EXCHANGE															
23½	28⅜	18⅜	30¼	15½	37	17⅝	20,400	135,100	Amer. Cyanamid "B"	10	2,520,368	.45	.91	2.09	1.77
90¾	91⅞	76	92	50	124	69	400	3,360	Celanese, 7% cum. 1st pfd.	100	148,179	8.53	8.95	22.32	24.47
4	5¼	3¾	6¾	3	15	3	225	3,025	Celluloid Corp.	15	194,952	....	—2.73	—.92	—.80
5⅝	6⅝	4¾	12	6½	14⅝	10½	100	600	Courtauld's Ltd.	£1	24,000,000	.29	.26%	8.64%	8.30%
6½	7	5	9⅞	6	10⅝	3½	1,000	4,000	Duval Texas Sulphur	No	500,000	....	.71	.43	.61
35	41½	30	41¼	27	47½	31	300	2,600	Heyden Chem. Corp.	100	149,643	1.50	2.07	3.94	3.56
100	117	90	115½	55	147½	77	3,200	30,000	Pittsburgh Plate Glass	25	2,142,443	1.75	3.00	8.53	7.15
92	113½	83	117¾	66	154¾	72¼	2,300	17,200	Sherwin Williams	25	638,927	2.50	2.43	8.76	8.04
113⅜	115¾	108½	114⅛	107	114	106¼	120	870	5% cum. pfd.	50	132,189	5.00	8.76	45.50	41.44
PHILADELPHIA STOCK EXCHANGE															
151	167	135	167	121½	179	115	150	635	Pennsylvania Salt	50	150,000	4.50	6.90	11.79	8.57

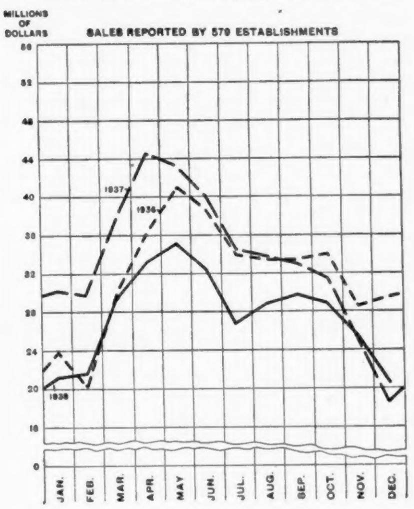
May 1939 Last	May 1939 High	May 1939 Low	1938 High	1938 Low	1937 High	1937 Low	Sales May 1939	Sales 1939	Bonds	Date Due	Int. %	Int. Period	Outstanding $
NEW YORK STOCK EXCHANGE							May 1939	1939					
103	103½	100¾	105⅜	99⅛	109½	99	171,000	1,413,000	Amer. I. G. Chem. Conv.	1949	5½	M-N	$25,300,000
25	26	19	38	25⅛	42½	23	47,000	330,000	Anglo Chilean Nitrate inc. deb.	1967	4½-5	J	12,067,000
105	108⅜	105	106⅛	102⅜	102⅞	100⅛	56,000	94,000	Dow Chemical	1951	3	J-D	5,000,000
103	103	99⅞	102¾	100	102	98½	74,000	111,000	Int. Agric. Corp. 1st Coll. tr. stpd. to 1942	1942	5	M-N	5,633,000
24⅝	27⅜	21½	35⅜	24¾	35⅜	21¼	278,000	758,000	Lautaro Nitrate n inc. deb.	1975	4	J-D	30,500,000
28	35	28	35⅜	24¾	25½	20½	.....	4,000	Ruhr Chem.	1948	6	A-D	1,500,000
105	106	103⅝	105	96½	102	93	196,000	1,706,000	Shell Union Oil	1951	3½	M-S	58,800,000
104½	105	102¾	104⅜	90¼	102¾	94	16,000	448,000	Skelly Oil	1951	4	J-J	9,000,000
105½	106¼	103⅛	105⅜	100	102	95	260,000	1,298,000	Standard Oil Co. (New Jersey) deb.	1961	3	J-D	85,000,000
105¼	105¾	103	103	98	...	...	272,000	1,221,000	Standard Oil Co. (New Jersey) deb.	1953	2¾	J-J	50,000,000
102⅝	103	101½	103	95	105	93½	8,000	83,000	Tenn. Corp. deb. "B"	1944	6	M-S	1,600,000
105⅛	108⅝	104¼	107⅜	103½	105¾	100	625,000	1,803,000	Texas Corp.	1951	3½	J-D	60,000,000
100	103½	96	101	77	111	81	18,000	299,000	Vanadium Corp. conv.	1941	5	A-O	2,800,000

* Paid in 1938, including extras but excluding dividends paid in stock. ** For either fiscal or calendar year.

Paint, Varnish, Lacquer, Fillers Sales

Statistics on sales of paint, varnish, lacquer, and fillers for the months of 1938 and 1937, and the totals for 1936 are given in the table opposite. Table 1 shows, by

PAINT, VARNISH, LACQUER, AND FILLERS



Bureau of the Census
3-Year Record of Sales by Months

months, for 579 establishments the total volume of sales reported, the volume reported by 344 establishments, which have classified their sales into trade and industrial (paint and varnish, and lacquer), and the volume of unclassified sales reported by 235 establishments. Table 2 shows statistics on sales for 680 establishments for the months of 1938 and 1937. The Table on page 6 shows, for the years 1929 to 1938, a summary of total sales, by months, by 579 establishments. Data are compiled by the Bureau of the Census.

Decline from '37

The '38 sales volume for paint, varnish, lacquer, and fillers was substantially below the record '37 figures, the latter having been the largest recorded since 1929. In '38, the total sales volume was $333,209,235, as against '37's $402,126,113, representing a disappointing drop of about 17%. In 1936, volume was $382,556,555; the peak year of '29 totaled sales of $420,514,471.

Sales of Lacquer by Quarters

Statistics on sales for clear lacquers, pigmented lacquers, lacquer bases, and dopes, and thinners for the quarters of 1938, 1937, and 1936 are given on page 6. Table 4 shows the sales of 158 identical manufacturers for the quarters of 1938, 1937, and 1936. Table 5 presents the sales by 102 identical manufacturers for the quarters of 1938, 1937, and 1936.

From these figures it is very clear that the second half of '38 was much better than the first half, but that the recovery was not sufficiently great to bring the total up to the volume attained in '37. Total sales of lacquer (158 identical manufacturers) in '38 amounted to 34,437,922 gals., valued at $42,828,124, as compared with 46,817,113 gals., in '37, with a value of $58,490,192. The decided slump in lacquer consumption, of course, can be largely attributed to the decline in automotive output last year. Production was almost cut in two. The '38 total of 2,650,000 units compared very unfavor-

PAINT, VARNISH, LACQUER AND FILLERS*
Table 1. Sales by 579 Establishments*

Year and Month	Total Sales Reported by 579 Establishments	Classified Sales Reported by 344 Establishments: Trade Sales of Paint, Varnish, and Lacquer	Industrial Sales: Total	Industrial Sales: Paint and Varnish	Industrial Sales: Lacquer	Unclassified Sales Reported by 235 Establishments
1938						
Jan.	$21,244,639	$8,631,776	$6,370,622	$4,496,216	$1,874,406	$6,242,241
Feb.	21,656,976	9,241,343	6,084,652	4,294,272	1,790,380	6,330,981
Mar. ...	29,449,307	12,782,596	7,938,478	5,642,517	2,295,961	8,728,233
April	33,286,130	15,197,013	7,946,041	5,773,505	2,172,536	10,143,076
May	35,293,888	16,491,815	7,623,206	5,528,808	2,094,398	11,178,867
June	32,389,541	14,967,879	7,418,403	5,443,872	1,974,531	10,003,259
July	26,730,148	11,909,284	6,603,187	4,894,875	1,708,312	8,217,677
Aug.	28,821,175	12,498,621	7,248,669	5,193,771	2,054,898	9,073,885
Sept.	29,768,939	12,235,340	7,878,889	5,413,863	2,465,026	9,654,710
Oct.	28,773,466	12,005,505	8,480,897	5,646,468	2,834,429	8,287,064
Nov.	25,280,489	9,969,952	8,396,652	5,461,661	2,934,991	6,913,885
Dec.	20,514,537	7,619,210	7,417,006	4,971,953	2,445,053	5,478,321
Tot. (Year)	**333,209,235**	**143,550,334**	**89,406,702**	**62,761,781**	**26,644,921**	**100,252,199**
1937						
Jan.	30,202,114	11,645,957	9,080,451	6,502,757	2,577,694	9,475,706
Feb.	29,749,109	10,738,586	9,518,160	6,840,489	2,677,671	9,492,363
Mar.	37,866,484	13,988,634	12,213,555	8,746,861	3,466,694	11,664,295
April	44,561,902	18,581,057	12,461,995	8,915,783	3,546,212	13,518,850
May	43,355,320	17,611,804	12,733,701	9,317,559	3,416,142	13,009,815
June	39,837,755	15,960,273	12,253,468	8,595,913	3,657,555	11,624,014
July	34,494,624	13,234,494	11,217,109	7,668,080	3,549,029	10,043,021
Aug.	33,784,877	13,242,578	10,431,468	7,072,652	3,358,816	10,110,831
Sept.	33,062,213	13,044,002	9,931,291	6,874,529	3,056,762	10,086,920
Oct.	31,486,019	11,732,934	10,493,711	6,733,681	3,760,030	9,259,374
Nov.	25,104,874	9,302,027	8,541,358	5,595,398	2,945,960	7,260,989
Dec.	18,621,322	6,756,539	6,566,790	4,571,971	1,994,819	5,297,993
Tot. (Year)	**402,126,113**	**155,836,885**	**125,443,057**	**87,435,673**	**38,007,384**	**120,844,171**
1936						
Tot. (Year)	**402,556,555**	**145,305,248**	**117,009,733**	**81,397,366**	**35,612,367**	**120,241,574**

Table 2. Sales by 680 Establishments†

Year and Month	Total Sales Reported by 680 Establishments	Classified Sales Reported by 580 Establishments: Trade Sales of Paint, Varnish, and Lacquer	Industrial Sales: Total	Industrial Sales: Paint and Varnish	Industrial Sales: Lacquer	Unclassified Sales Reported by 100 Establishments
1938						
Jan.	$22,115,195	$11,448,115	$8,262,661	$5,748,170	$2,534,491	$2,384,419
Feb.	22,625,906	12,535,636	7,942,419	5,455,659	2,486,760	2,147,851
Mar.	30,728,890	17,227,950	10,417,161	7,285,635	3,131,526	3,083,779
April	34,731,597	20,861,998	10,392,797	7,498,010	2,894,787	3,476,802
May	36,827,421	22,900,709	10,135,607	7,292,333	2,843,274	3,791,105
June	33,936,706	20,767,900	9,763,856	7,049,096	2,714,760	3,404,950
July	27,946,084	16,368,159	8,806,128	6,384,620	2,421,508	2,771,797
Aug.	30,182,013	17,224,845	9,894,867	6,879,994	3,014,873	3,062,301
Sept.	31,046,584	17,431,211	10,492,087	7,139,367	3,352,720	3,123,286
Oct.	30,007,078	16,128,067	10,985,822	7,343,960	3,641,862	2,893,189
Nov.	26,253,314	13,183,545	10,638,281	6,950,589	3,687,692	2,431,488
Dec.	21,281,326	9,885,307	9,293,043	6,166,468	3,126,575	2,102,976
Tot. (Year)	**347,682,114**	**195,963,442**	**117,044,729**	**81,193,901**	**35,850,828**	**34,673,943**
1937						
Tot. (Year)	**419,103,821**	**215,868,460**	**164,160,287**	**115,295,425**	**48,864,862**	**39,075,074**

* Source: Dept. of Commerce, Bureau of the Census.
† Includes data for establishments shown in Table 1.

Paints, Varnish, Lacquers, Shellac, Fillers, 1938
Sales, Exports, Employment data, Prices, etc.—p. 5

Paints, Varnish, Lacquers, Shellac, Fillers, 1938

Sales, Exports, Employment data, Prices, etc.—p. 6

PAINT, VARNISH, LACQUER AND FILLERS*

Table 3. Summary of Total Sales by 579 Establishments, by Months, 1929-1938

Month	1938	1937	1936	1935	1934	1933	1932	1931	1930	1929
Jan.	$21,244,639	$30,202,114	$23,803,627	$20,835,518	$20,141,156	$11,199,240	$15,888,855	$20,310,784	$26,617,208	$30,824,446
Feb.	21,656,976	29,749,109	20,180,869	21,229,132	17,287,724	11,565,136	16,262,576	20,894,853	28,364,474	30,846,424
Mar.	29,449,307	37,866,484	29,912,407	26,544,245	22,627,382	13,472,526	19,079,705	26,742,550	32,796,286	39,750,854
April	33,286,130	44,561,902	36,209,030	32,851,225	27,116,692	18,914,864	22,601,920	31,851,281	38,459,583	43,042,015
May	35,293,888	43,355,320	40,949,831	36,160,067	32,991,160	26,029,578	24,972,762	33,383,847	37,006,677	46,200,757
June	32,389,541	39,837,755	38,735,681	32,325,512	28,154,013	27,602,184	19,624,641	28,571,399	36,476,680	41,362,280
July	26,730,148	34,494,624	33,919,137	28,975,289	22,942,907	21,878,744	14,376,301	22,589,377	29,243,951	38,006,714
Aug.	28,821,175	33,784,877	33,380,037	28,501,654	23,771,319	20,372,499	15,975,278	21,303,007	27,916,739	42,071,846
Sept.	29,768,939	33,062,213	33,449,725	28,536,075	21,714,509	18,903,549	16,751,179	21,925,486	28,149,101	36,484,869
Oct.	28,773,466	31,486,019	34,048,582	32,853,356	23,652,268	18,614,304	15,536,898	20,726,978	26,553,618	35,888,912
Nov.	25,280,489	25,104,374	28,502,938	25,426,631	19,801,013	15,937,120	12,424,213	16,479,234	19,895,890	28,148,862
Dec.	20,514,537	18,621,322	29,464,691	20,038,905	16,005,974	15,814,149	9,426,271	13,476,516	16,672,485	22,189,467
Total	333,209,235	402,126,113	382,556,555	334,277,609	276,206,117	220,303,893	202,920,599	278,255,312	348,152,692	434,817,446

TABLE 4. SALES OF LACQUER (158 IDENTICAL MANUFACTURERS)*

Year and Quarter	Total		Clear Lacquers		Pigmented Lacquers		Lacquer Bases and Dopes		Thinners	
	Gallons	Value	Gallons	Value	Gallons	Value	Gallons	Value	Gallons	Value
1938										
1st Qtr.	7,934,838	$9,860,662	1,899,387	$2,569,578	1,986,213	$4,336,589	422,312	$510,812	3,626,926	$2,443,683
2nd Qtr.	7,981,566	10,209,757	1,790,186	2,448,785	2,014,625	4,646,697	353,983	415,467	3,822,772	2,698,808
3rd Qtr.	8,333,092	10,642,149	2,234,257	2,978,714	1,964,971	4,510,405	407,592	483,624	3,726,272	2,669,406
4th Qtr.	10,188,426	12,115,556	2,386,133	3,098,198	2,470,574	5,434,187	516,153	582,005	4,815,566	3,001,166
Total (Year)	34,437,922	42,828,124	8,309,963	11,095,275	8,436,383	18,927,878	1,700,040	1,991,908	15,991,536	10,813,063
1937										
1st Qtr.	11,404,989	14,347,417	2,784,003	3,779,869	3,040,828	6,532,807	523,630	610,805	5,056,528	3,423,936
2nd Qtr.	13,066,499	16,160,078	2,777,704	3,779,829	3,552,172	7,715,091	562,702	644,074	6,173,921	4,021,084
3rd Qtr.	12,135,940	15,294,633	2,835,367	3,907,001	3,135,340	6,988,415	499,522	574,241	5,665,711	3,824,976
4th Qtr.	10,209,685	12,688,064	2,259,966	3,070,026	2,695,660	6,062,869	367,064	422,974	4,886,995	3,132,195
Total (Year)	46,817,113	58,490,192	10,657,040	14,536,725	12,424,000	27,299,182	1,952,918	2,252,094	21,783,155	14,402,191

TABLE 5. SALES OF LACQUER (102 IDENTICAL MANUFACTURERS)

Year and Quarter	Total		Clear Lacquers		Pigmented Lacquers		Lacquer Bases and Dopes		Thinners	
	Gallons	Value	Gallons	Value	Gallons	Value	Gallons	Value	Gallons	Value
1938										
1st. Qtr.	7,051,156	$8,841,848	1,566,299	$2,187,904	1,824,895	$4,005,287	343,419	$433,106	3,316,543	$2,215,551
2nd Qtr.	7,082,025	9,150,440	1,451,543	2,044,840	1,860,386	4,311,835	260,472	324,610	3,509,624	2,469,155
3rd Qtr.	7,320,788	9,482,187	1,827,017	2,529,073	1,785,780	4,138,315	294,840	373,314	3,413,151	2,441,485
4th Qtr.	8,954,547	10,837,094	1,856,222	2,631,914	2,265,185	5,016,510	371,074	437,606	4,462,066	2,751,064
Total (Year)	30,408,516	38,311,569	6,701,081	9,393,731	7,736,246	17,471,947	1,269,805	1,568,636	14,701,384	9,877,255
1937										
1st Qtr.	10,006,491	12,656,240	2,228,316	3,167,905	2,766,286	5,932,016	380,933	470,700	4,630,956	3,085,619
2nd Qtr.	11,738,981	14,594,855	2,268,587	3,208,237	3,303,895	7,194,952	397,379	479,314	5,769,120	3,712,352
3rd Qtr.	10,841,137	13,720,926	2,347,962	3,326,580	2,891,697	6,463,902	329,664	405,170	5,271,814	3,525,274
4th Qtr.	9,094,998	11,388,970	1,793,884	2,552,002	2,507,755	5,648,557	256,046	316,380	4,537,313	2,872,031
Total (Year)	41,681,607	52,360,991	8,638,749	12,254,724	11,469,633	25,239,427	1,364,022	1,671,564	20,209,203	13,195,276

* Source: Dept. of Commerce, Bureau of the Census.

ably with the 5,016,565 units turned out in '37 and the 1938 total was almost equal to the 1934 rate.

Coatings '39

The year 1939 should be a decided improvement for coatings manufacturers over the volume of business transacted last year and may approximate '37 levels.

The demand for industrial coatings for the first 5 months of '39 by the automotive makers has been encouraging and although an earlier than usual seasonal slump is expected because of an earlier show period, the stocks of finished cars in the hands of dealers are small. Coatings manufacturers should experience a sharp rebound in the late July-August period.

During the first 4 months of '39 the number of new dwelling units constructed in the 37 Eastern states was 86% greater than in the corresponding period last year, and the dollar value of residential contracts was 73% ahead of 1938, according to the F. W. Dodge Corp. The only potential setback to residential construction visible, so far, is the delay in enactment by Congress of new amendments to the national housing act. Forty-four million dollars worth of private-enterprise rental housing is being held up pending the final enactment of this legislation.

Paints, Varnish, Lacquers, Shellac, Fillers, 1938

Sales, Exports, Employment data, Prices, etc.—p. 7

Index of Prices*, Paints and Paint Materials, by Months, for the Years 1935-1938*

(1926 = 100)

Month	1938	1937	1936	1935
January	80.1	83.7	79.6	79.0
February	79.2	83.4	79.5	78.8
March	82.2	83.9	79.2	79.4
April	81.4	83.9	79.3	79.2
May	80.9	83.7	78.8	79.9
June	80.1	83.6	79.5	79.5
July	80.5	83.9	80.4	79.1
August	80.5	84.1	81.0	78.6
September	80.4	84.6	80.6	80.8
October	81.1	84.2	80.2	81.9
November	80.9	81.5	80.5	80.3
December	81.0	80.2	82.4	80.0
Year	**81.3**	**83.4**	**80.1**	**79.8**

* Source: U. S. Dept. of Labor.

Purchasing Power of the Wholesale Price Dollar, Paints and Paint Materials, for the Years 1935-1938

(1926 = $1.00)

Month	1938	1937	1936	1935
January ..	$1.248	$1.195	$1.256	$1.266
February .	1.263	1.199	1.258	1.269
March ...	1.217	1.192	1.263	1.259
April	1.229	1.192	1.261	1.263
May	1.236	1.195	1.269	1.252
June	1.248	1.196	1.258	1.253
July	1.242	1.192	1.244	1.264
August ..	1.242	1.189	1.235	1.272
September	1.244	1.182	1.241	1.238
October ..	1.233	1.188	1.247	1.221
November	1.236	1.227	1.242	1.245
December	1.235	1.247	1.214	1.250

Drop in Shellac Imports

Total imports of crude lac, and unbleached and bleached shellac into the U. S. decreased markedly during 1938, as compared with '37 and '36. Total imports of these items in '38 fell about 29% from the corresponding '37 total. Separate import figures of these items for 1938 and 1937 are as follows:

U. S. Shellac Imports, 1937, 1938*

Item—1937	Quantity Lbs.	Value
Crude lac	20,678,070	$1,734,954
Unbleached shellac	20,326,467	2,176,732
Bleached shellac..	433,779	70,731
1938		
Crude lac	15,154,460	$ 992,251
Unbleached shellac	12,374,702	1,089,551
Bleached shellac..	178,196	27,139

Paint Exports

U. S. exports of pigments, paints, and varnishes, valued at $18,654,592 in 1938, fell about 14% from the corresponding figure for '37, $21,550,000.

Of the several items in the export lists of the Department of Commerce, not one

* Source: Chem. Div., Bureau of Foreign and Domestic Commerce.

PLASTIC PAINTS, COLD WATER PAINTS, AND CALCIMINES—SUMMARY, BY MONTHS, 1938*

Item	Total	December	November	October	September	August	July	June	May	April	March	February	January
Plastic Paints, Total: Pounds	6.306,594	411,519	458,246	573,692	542,470	556,684	558,129	504,812	576,041	578,469	616,744	484,667	445,121
Value	$482,417	$29,670	$34,102	$46,990	$41,639	$44,299	$42,621	$42,947	$45,341	$43,617	$46,366	$32,945	$31,880
Paste:													
Casein Bound—Pounds	1.149,788	40,498	67,125	121,804	126,929	148,405	124,646	127,502	138,991	86,920	86,948	43,055	36,965
Value	$137,800	$4,632	$7,450	$14,705	$15,424	$15,782	$13,771	$16,680	$16,907	$11,157	$11,093	$5,525	$4,674
All Other Plastic Paste—Pounds	416,428	36,579	31,394	73,336	39,188	44,800	38,081	35,156	18,481	23,431	29,266	23,444	23,272
Value	$39,599	$3,734	$3,279	$7,165	$3,459	$3,891	$3,410	$3,201	$1,871	$2,285	$2,944	$1,876	$2,484
Dry Powder, total: Pounds	4,740,378	334,442	359,727	378,552	376,353	363,479	395,402	342,154	418,569	468,118	500,530	418,168	384,884
Value	$305,018	$21,304	$23,373	$25,120	$22,756	$24,626	$25,440	$23,066	$26,563	$30,175	$32,329	$25,544	$24,722
Casein Bound—Pounds	3,086,376	239,407	231,191	247,371	251,078	228,670	255,497	246,012	281,932	311,678	308,699	252,593	232,248
Value	$223,019	$16,553	$16,817	$18,570	$16,476	$18,000	$18,831	$18,233	$20,069	$22,474	$22,634	$17,133	$17,229
Glue Bound—Pounds	1,654,002	95,035	128,536	131,181	125,275	134,809	139,905	96,142	136,637	156,440	191,831	165,575	152,636
Value	$81,999	$4,751	$6,556	$6,550	$6,280	$6,626	$6,609	$4,833	$6,494	$7,701	$9,695	$8,411	$7,493
Cold Water Paints (Paste or Dry Powder Form), Total, Value	$4,536,806	$282,555	$305,007	$408,723	$381,594	$403,241	$372,258	$368,529	$419,912	$481,282	$496,224	$331,085	$286,396
Exterior, total, value	$870,847	$52,282	$59,913	$80,569	$77,018	$86,567	$70,861	$82,144	$96,673	$83,004	$70,043	$64,467	$47,306
Casein Bound—Pounds	4,629,000	298,810	299,803	326,207	322,692	355,262	301,428	406,171	480,176	414,968	423,172	631,637	368,674
Value	$235,309	$17,139	$15,832	$17,400	$17,375	$18,529	$15,811	$16,445	$24,864	$20,993	$22,363	$30,965	$17,593
Lime and/or Cement Bound—Pounds..	8,666,299	476,291	607,918	850,246	803,301	943,483	775,204	895,679	956,905	842,334	645,530	457,920	411,488
Value	$635,538	$35,143	$44,081	$63,169	$59,643	$68,038	$55,050	$65,699	$71,809	$62,011	47,680	$33,502	$29,713
Interior, total, value	$3,665,959	$230,273	$245,094	$328,154	$304,576	$316,674	$301,397	$286,385	$323,239	$398,278	$426,181	$266,618	$239,090
Casein Bound:													
Paste Form—Gallons .... } Semi-Paste Form—Gallons ...... }	2,163,095	142,800	157,391	207,600	178,472	195,861	182,566	167,015	185,716	231,986	218,794	150,248	144,646
Value .... } Value .... }	$2,683,463	$169,130	$190,462	$253,027	$219,457	$243,792	$224,630	$202,915	$235,599	$293,511	$272,794	$193,384	$184,762
Dry Powder Form—Pounds	11,003,908	686,336	624,149	879,598	981,278	844,516	897,743	961,787	1,055,405	1,244,041	1,114,149	829,767	885,139
Value	$863,265	$51,783	$46,444	$64,945	$74,738	$62,796	$67,803	$74,936	$76,552	$93,418	$140,956	$63,464	$45,430
Glue Bound—Pounds	4,539,340	353,287	302,492	392,612	395,635	397,137	334,596	366,516	392,356	409,251	475,501	367,257	352,700
Value	$119,231	$9,360	$8,188	$10,182	$10,381	$10,086	$8,964	$8,534	$11,088	$11,349	$12,431	$9,770	$8,898
Calcimines, Total: Pounds	73,694,769	5,249,007	5,422,495	5,919,823	6,823,904	5,731,130	4,924,302	5,642,284	6,972,494	7,348,551	7,543,936	5,804,151	6,312,692
Value	$3,077,748	$221,568	$225,698	$245,264	$282,487	$241,959	$212,844	$242,544	$286,317	$304,579	$312,244	$242,848	$259,396
Hot Water—Pounds	37,455,711	2,465,470	2,744,184	3,018,512	3,823,752	2,975,642	2,340,265	2,688,685	3,847,804	3,895,926	3,722,743	2,639,278	3,293,450
Value	$1,478,334	$94,806	$103,000	$111,285	$146,348	$113,004	$91,316	$105,415	$156,813	$157,548	$151,957	$110,598	$136,244
Cold Water—Pounds	36,239,058	2,783,537	2,678,311	2,901,311	3,000,152	2,755,488	2,584,037	2,953,599	3,124,690	3,452,625	3,821,193	3,164,873	3,019,242
Value	$1,599,414	$126,762	$122,698	$133,979	$136,139	$128,955	$121,528	$137,129	$129,504	$147,031	$160,287	$132,250	$123,152

* Source: Dept. of Commerce, Bureau of the Census.

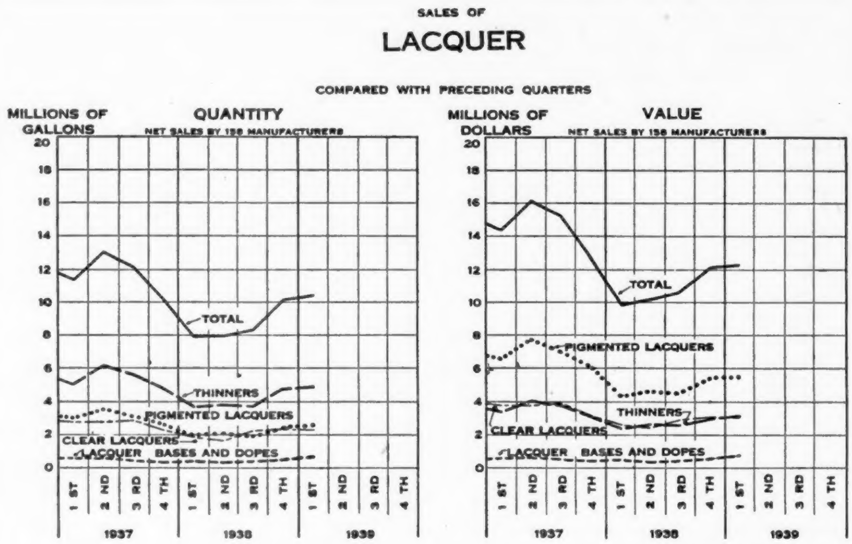
Paints, Varnish, Lacquers, Shellac, Fillers, 1938

Sales, Exports, Employment data, Prices, etc.—p. 8

EXPORTS OF PAINTS, VARNISHES AND LACQUERS BY MONTHS AND TOTALS, 1938*

Product	January	February	March	April	May	June	July	August	September	October	November	December	Total, 1938
Nitrocellulose, wet down and in sol.—Pounds..	418,424	292,428	554,356	339,429	381,836	138,663	274,025	326,835	266,137	463,348	251,675	451,014	4,158,170
Value	$72,902	$64,349	$91,348	$74,639	$73,355	$26,790	$53,774	$60,913	$51,138	$84,586	$52,056	$82,734	$788,584
Bituminous Paints—Value	$17,167	$12,509	$19,817	$24,680	$21,847	$26,138	$26,505	$17,265	$21,769	$27,310	$20,709	$27,850	$263,566
Paste Paint—Value	$28,233	$29,931	$31,869	$27,521	$24,436	$34,490	$34,123	$29,690	$33,577	$39,427	$24,257	$43,820	$382,739
Cold-water Paints, dry—Pounds	485,778	547,003	736,031	489,867	647,041	519,200	618,844	639,256	499,048	867,421	676,523	854,562	7,584,198
Value	$26,344	$29,662	$38,946	$27,067	$40,618	$28,584	$35,339	$36,672	$26,011	$44,956	$36,602	$41,406	$412,334
Nitrocellulose Lacquers, pigmented—Gallons ..	59,621	53,907	62,146	51,202	48,200	40,228	34,901	85,218	46,126	64,266	36,404	67,814	600,033
Value	$134,927	$123,684	$148,905	$122,202	$113,629	$104,155	$84,447	$87,206	$105,951	$154,406	$88,082	$149,676	$1,417,270
Nitrocellulose Lacquers, clear—Gallons	14,701	12,371	17,651	26,876	31,121	11,069	13,591	11,824	12,637	24,158	12,868	15,920	204,787
Value	$30,318	$27,668	$40,291	$54,243	$37,376	$22,772	$31,545	$25,807	$27,966	$61,666	$26,373	$34,684	$420,709
Thinners for Nitrocellulose Lacquers—Gallons..	69,789	46,117	61,229	77,277	46,093	53,593	45,210	49,874	56,542	64,650	56,429	71,655	698,458
Value	$47,981	$33,117	$50,609	$56,113	$35,776	$38,446	$34,514	$40,562	$40,478	$49,302	$40,354	$52,470	$521,950
Ready-mixed Paints, Stains, Enamels—Gallons	191,935	163,088	231,792	219,223	202,270	173,727	213,414	184,011	196,311	183,612	197,204	212,648	2,366,457
Value	$333,972	$282,285	$391,321	$398,002	$348,989	$328,027	$384,672	332,788	$348,602	$346,251	$354,908	$389,878	$4,239,695
Varnishes—Gallons	30,431	34,845	33,192	32,711	29,683	36,962	23,229	30,333	31,636	30,337	33,730	39,050	386,139
Value	$45,158	$47,327	$48,962	$49,016	$46,035	$53,553	$35,672	$43,515	$42,031	$46,311	$45,887	$50,588	$554,055

* Source: Dept. of Commerce, Bureau of Foreign & Domestic Commerce.



Bureau of the Census

PAINT AND VARNISH EMPLOYMENT, PAY ROLLS, HOURS AND EARNINGS, 1937 AND 1938*

Month	Employment 1938	Employment 1937	Payrolls 1938	Payrolls 1937	Average Weekly Earnings 1938	Average Weekly Earnings 1937	Average Hours Worked per Week 1938	Average Hours Worked per Week 1937	Average Hourly Earnings 1938	Average Hourly Earnings 1937
January	116.3	128.0	106.4	120.3	25.16	25.91	35.9	41.2	70.1	63.0
February	116.0	131.2	110.5	127.2	26.26	26.74	37.6	42.5	69.7	63.1
March	117.3	134.6	113.3	133.1	26.70	27.21	38.3	42.9	69.7	63.5
April	118.0	138.2	116.7	142.1	27.11	28.12	39.4	43.4	68.9	65.0
May	118.7	140.2	122.2	145.0	28.17	28.47	40.7	43.7	69.3	65.4
June	116.7	138.9	118.2	142.7	27.79	28.54	39.9	42.5	69.7	67.4
July	114.6	136.3	113.5	138.3	27.38	27.86	38.8	41.0	70.7	68.2
August	110.6	132.8	111.2	135.4	27.39	28.06	39.2	40.7	70.0	69.0
September ...	112.5	132.4	114.5	131.6	27.70	27.53	39.7	39.6	69.9	69.6
October	112.9	131.6	116.3	134.1	27.83	28.17	40.1	40.5	69.4	69.7
November ...	112.4	128.0	113.8	124.8	27.34	26.95	39.4	38.8	69.5	69.6
December	112.4	....	115.4	....	27.80	....	39.9	...	69.9	...

* Source: U. S. Dept. of Labor. Indexes are based on 3-year average 1923-25 = 100. Indexes through July '38 are adjusted to 1933 Census of Manufactures; indexes beginning with August '38 are adjusted to 1935 Census of Manufactures and are not comparable to those published prior to August '38

registered any gains last year; all showed definite drops in shipments, ranging from 5 to 15% in most instances.

In all, exports of ready-mixed paints, varnishes, and lacquers exceeded 4,000,000 gals., valued at over 7,000,000, comparing unfavorably with the previous year's total of over 5,000,000 gals. valued at nearly $8,200,000. Included in this classification were shipments of ready-mixed paints amounting to 2,366,457 gals., comparing poorly with '37's, 2,693,500 gals.; varnishes totaled 386,139 gals., compared with the previous year's 486,000; and lacquers, totaling 1,503,278 gals., likewise showed a substantial drop, when compared with '37's 1,916,000.

Bituminous paints amounted to $263,566, in value of exports, considerably less than '37's $331,500; paste and semi-paste paints, in shipments totaling 2,509,043 lbs., were valued at $382,739, compared with the previous year's 2,744,000 lbs. valued at $407,120; kalsomines, or cold-water paints, totaled 7,584,198 lbs., compared with '37's 8,652,500 lbs.

Exports of Pigments

Exports of chemical pigments fell markedly, from '37's 214,000,000 lbs. to about a little more than 190,000,000 lbs. Shipments of carbon black, included in this classification, amounted to nearly 168,000,000 lbs., as compared with 184,000,000 in '37. Shipments of mineral earth pigments were valued at $589,600, amounting to 43,170,000 lbs., about 7% less than in '37.

Imports of Tung Oil

Imports of tung oil totaled 107,455,674 lbs., valued at $11,923,480; in 1940, the Department of Commerce expects to be able to produce data on the situation in the United States, with regard to the existent domestic sources of the tung nut, most of which are located in the southeastern states. In '37 were imported 175,000,000 lbs. of tung oil.

Comparable Figures

For comparable statistical data for earlier years on paints, varnish, lacquers, shellac, etc., refer to Part 2, "Chemical Industries," (Statistical & Technical Data Section) May 1938, pages 607-610.

U. S. Chemical Patents
Off. Gaz.—Vol. 501, Nos. 3, 4—Vol. 502, Nos. 1, 2—p. 104

A Complete Check-List of Products, Chemicals, Process Industries

Agricultural Chemicals

Process manufacturing a granular fertilizer, from ammonium nitrate and an inert, finely-divided solid; process essentially involves spray-drying molten mixture to produce granular powder. No. 2,155,372. Herman A. Beekhuis, Jr., Petersburg, Va., to The Solvay Process Co., New York City.

Manufacture a phosphatic fertilizer by combining, at 1000-1200 deg. C., a mineral phosphate with alkali metal orthophosphate. No. 2,155,556. Friedrich P. Kerschbaum, Winter Haven, Fla., to Harold T. Stowell, Washington, D. C.

Manufacture a fertilizer material, the basic raw material being calcium cyanamide. No. 2,157,541. Kuro Hosokawa, Suwa-gun, Nagano-ken, Japan, to Takewo Ozawa, Tokyo, Japan.

Cellulose

Method of treating and processing abietylic materials. No. 2,154,629. Edwin R. Littmann, to Hercules Powder Co., both of Wilmington, Del.

Process for manufacture of synthetic filament from cellulosic materials. No. 2,155,067. Leo Ubbelohde, Berlin-Charlottenburg, Germany.

Process extraction lignin from finely-divided lignin-cellulose materials, and method manufacturing a thermo-setting compound therewith. Nos. 2,156,159-60. Edgar T. Olson, Marquette, Mich., and Raphael Katzen and Richard H. Plow, Phelps, Wis., to Northwood Chemical Co., Phelps, Wis.

Process producing zein filaments from solutions of zein in a water-soluble organic solvent. Nos. 2,156,928-9. Lloyd C. Swallen, Pekin, Ill., to Corn Products Refining Co., New York City.

Method preparing cellulose ethers. No. 2,157,083. Floyd C. Peterson, Syracuse, N. Y., and Arthur J. Barry, Midland, Mich., to The Dow Chemical Co., Midland, Mich.

Production low-substituted alkyl celluloses. No. 2,157,530. Deane C. Ellsworth, deceased, late of Wilmington, Del., by Joseph F. Haskins, administrator, and Frederick C. Hahn, to E. I. du Pont de Nemours & Co., Inc., all of Wilmington, Del.

Chemical Specialty

Wood-preservative process, comprising the application to fibrous material of aqueous zinc chromate. No. 2,154,433. Ernest R. Boller, Cleveland Heights, Ohio, to E. I. du Pont de Nemours & Co., Wilmington, Del.

Abrasive, comprising finely divided abrasive material embodied in a matrix consisting of a synthetic linear condensation polyamide. No. 2,154,436. Willard E. Catlin, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Grease-setting agent, a resinous product of the reaction between pseudo-pimaric acid and a sulfonating agent, said product being obtained from the aqueous extracts. No. 2,154,616. Torsten Hasselstrom, Savannah, Ga., to G. & A. Laboratories, Savannah, Ga.

Lubricant, comprising a hydrocarbon oil containing not over 10% of a dialkyl polysulfide containing elemental sulfur. No. 2,154,628. Bert H. Lincoln, Ponca City, Okla., to Continental Oil Co., Ponca City, Okla.

Automobile polish, comprising a fine abrasive, an oxidized fatty oil (glossening agent), a gum emulsifier, an aliphatic alcohol, and water. No. 2,154,721. Arthur L. Blount, Palos Verdes Estates, and Marcellus T. Flaxman, Wilmington, Calif., to Union Oil Co. of California, Los Angeles, Calif.

Hair waving preparation, comprising a 10-20% aqueous solution of a morpholine (boiling between 80 and 140 deg. C.) and containing also about 10% of oil; emulsification is induced by addition of small quantity of a higher fatty acid. No. 2,154,924. Alexander L. Wilson, Indiana Township, Allegheny County, and Henri Morin, Mount Lebanon Township, Allegheny County, Pa.; said Wilson to Carbide and Carbon Chemicals Corp., of New York.

Process manufacturing a dry, free-flowing detergent powder, wherein a water-soluble polyhydric fatty acid ester containing unesterified hydroxyl groups is treated with aqueous alkaline sulfate, the solution so prepared that the spray-dried mixture yields a dry, clean powder. No. 2,154,977. Reginald Furness, Warrington, and Arthur Fairbourne, Bebington, Eng., to Lever Bros., Ltd., Port Sunlight, Eng.

An insecticide, wherein the active ingredient is N-nitroso-diphenylamine. No. 2,155,010. Andrew F. Freeman, Hyattsville, Md.; dedicated to the free use of the People in the United States.

Detergent for cleaning zinc, iron, and tinware, comprising about 85% water-soluble inorganic alkaline detergent, about 6% solid hypochlorite of the alkali or alkaline earth metals, and about 9% of a zinc salt; corrosion-resistant properties are said to be conferred by this compound. No. 2,155,045. Carroll L. Griffith and Lloyd A. Hall, to The Griffith Laboratories, Inc., both of Chicago, Ill.

Detergent for cleaning zinc, iron, tin, and aluminum ware, comprising about 65-70% water-soluble alkaline inorganic detergent, about 15-20% sodium silicate, about 5-6% solid hypochlorite of the alkali metal and alkaline earth group, and about 9-10% zinc sulfate; corrosion-resistant properties are claimed to be conferred by this compound. No. 2,155,046. Carroll L. Griffith and Lloyd A. Hall, to The Griffith Laboratories, Inc., all of Chicago, Ill.

Lubricant, comprising essentially halogenated complex petroleum-derived materials, the less stable members of the latter having been polymerized in the presence of anhydrous aluminum chloride. No. 2,155,204. Carl F. Prutton, Cleveland Heights, Ohio, to The Lubri-Zol Development Corp., Cleveland, Ohio.

A disinfectant, 2,6-dichlorbenzyl-decyl-methyl-sulfonium-methyl sulfate; also, a disinfectant, dodecyl-benzyl-methyl-sulfonium-methyl sulfate. No. 2,155,504. Wilhelm Neugebauer Wiesbaden-Biebrich, Germany, to Alba Pharmaceutical Co., Inc., New York City.

Insecticidal oil spray for trees, comprising a mineral distillate of Saybolt viscosity of 40-80 at 100 deg. F., containing not over 5% oil-soluble visco-resin. No. 2,155,630. John A. Anderson, Olympia Fields, Ill., to Standard Oil Co., Chicago, Ill.

Insecticidal tree spray, a white oil containing dissolved aluminum soap (small quantity), a hydroxy ester of a high molecular weight organic acid (lesser quantity than that of the metallic soap), and about 1-10% nicotine naphthenate containing excess of naphthenic acid. No. 2,155,-946. Daniel G. Loetscher, Hammond, Ind., to Standard Oil Co., Chicago, Ill.

Rodent lure, containing a solid water-insoluble starchy foodstuff and a halogenated aliphatic glycol. No. 2,155,949. Hans Maier-Bode, Karl Brodersen, and Hermann Behncke, Dessau in Anhalt, Germany, to Winthrop Chemical Co., Inc., New York City.

Composition of matter increasing, it is claimed, the efficiency of internal combustion engines, consisting of water-moistened, finely-divided, exfoliated vermiculite, lubricating oil, and sulfonated non-mineral oil intermixed to form a homogeneous mass. No. 2,155,981. Otto W. Schmidt, Kansas City, Mo., to M. W. Borders, Jr., Kansas City, Mo.

Power-transmitting fluid, a mixture of butylene glycol diacetate and castor oil in equal volumes. No. 2,156,130. William Percival Smith, London, Eng.

High pressure lubricant, comprising a major portion of a mineral lubricating oil, a minor proportion of halogenated petroleum wax, and an agent containing "corrosive" sulfur. No. 2,156,265. Floyd L. Miller and Charles F. Smith, Elizabeth, N. J., to Standard Oil Development Co., a corp. of Delaware.

Pressure-sensitive adhesive tape, comprising a gelatin sheet, then one side treated with a chlorinated rubber composition surmounted by an adhesive layer, the other side coated with a mixture of a chlorinated naphthalin wax and chlorinated rubber. No. 2,156,335. Leon W. Geller, Astoria, Long Island, N. Y., one-half to Nelson J. Fonarow and one-half to Edward J. Carter, both of New York City.

Adhesive sheet having substantially transparent backing, and an adhesive coating of raw rubber and low-acid type ester gum firmly united thereto; adhesive qualities to confer tacky and pressure-sensitive characteristics to the sheet. No. 2,156,380. Richard Gurley Drew, to Minnesota Mining & Manufacturing Co., both of St. Paul, Minn.

Coated abrasive, comprising paper backing to which is bonded a fabric, and an abrasive material bonded to the face of said fabric, said paper being unsized and saturated with a water-soluble gum solution. No. 2,-156,492. John F. A. Davis, Hamilton, Mass.

Yeast preparation for ice cream mixtures, comprising a composite mixture of powdered brewer's yeast and powdered India gum, with admixed sodium bicarbonate and citric acid. No. 2,156,499. Lloyd M. Holcomb, Perry, Iowa.

A vegetable parchment having a composition coating of a rubber hydrochloride and a resin of the group comprising chlorinated diphenyls, polycumarones, rosin, copal, ester gums, etc. No. 2,156,755. Erich Gegauer-Fuelnegg, deceased, late of Evanston, Ill., by Marie Gebauer-Fuelnegg, admin., Evanston, Ill., and Eugene W. Moffett, Chicago, Ill., to Marbo Patents, Ini., a corp. of Delaware.

Soil fumigant and weed killer, consisting of carbon bisulfide containing 10% or less of a dichlorbenzene. No. 2,156,789. Edmund C. Missbach, Oakland, Calif., to Wheeler, Reynolds and Stauffer, a corp. of Del.

Aqueous spray material, consisting of a dry, powdered sulfur containing about 1% of a non-hygroscopic wetting agent, and about an equal volume of a finely-divided solid filler. No. 2,156,790. Edmund C. Missbach, Oakland, Calif., to San Francisco Sulphur Co., a corp. of California.

Lubricant, comprising a lubricating oil or grease, and a small percentage of molybdenum sulfide. No. 2,156,803. Hugh S. Cooper, Shaker Heights, and Vivian R. Damerell, Cleveland, Ohio, to Cooper Products, Inc., Cleveland, Ohio.

Adhesive, comprising a 20-35% solution zein in aqueous alcohol containing from 2 to 50% formaldehyde, based on the weight of zein. No. 2,156,927. Oswald Sturken, Closter, N. J., to Corn Products Refining Co., New York City.

A wrapper for foodstuffs containing aluminum-corroding ingredients, comprising aluminum foil coated with an admixture of polymerized vinyl ester with a plasticizer. No. 2,156,987. Thomas Morley Hill, New Kensington, Pa., to Aluminum Co. of America, Pittsburgh, Pa.

A lubricant, comprising a major portion of hydrocarbon oil, and a minor proportion of halogenated polyhydroxy cyclic ester. Nos. 2,157,-078-9. Bert H. Lincoln and Gordon D. Byrkit, Ponca City, Okla., to The Lubri-Zol Development Corp., Cleveland, Ohio.

Lubricant, containing a mineral oil and a small percentage of a halogenated aryl-alkyl hydrocarbon condensate. No. 2,157,134. Bert H. Lincoln and Alfred Henriksen, Ponca City, Okla., to The Lubri-Zol Development Corp., Cleveland, Ohio.

Insect trap and exterminator, comprising a stiff, sheet-like material having a non-tacky coating of an insect feed and yellow phosphorous; part of said sheet is left untreated, to permit of convenient handling. No. 2,157,449. Max Berg, Tulsa, Okla.

Extreme pressure lubricant, containing an ester of thiophosphoric acid. No. 2,157,452. Robert L. Humphreys, Berkeley, Calif., to Standard Oil Co. of California, San Francisco, Calif.

Production of a lead drier composition, comprising basic lead naphthenate mixed with non-basic naphthenate of cobalt or manganese, and with lead resinate. No. 2,157,768. Kenneth E. Long, South Euclid Ohio, to The Harshaw Chemical Co., Elyria, Ohio.

Mothproofing composition, comprising a solution in an organic solvent of a guanidine salt. No. 2,157,854. David W. Jayne, Jr., Elizabeth, N. J., to American Cyanamid Co., New York City.

Parasiticidal composition, comprising a copper zeolite and a phosphate salt. No. 2,157,861. Alexander A. Nikitin, Newark, and James F. Adams, Wilmington, Del., to Walter C. O'Kane, Durham, N. H., and Paul Moore, Washington, D. C., as trustees of Crop Protection Institute, Washington, D. C.

Extreme pressure lubricant, the oil containing an organic derivative of sulfur, chlorine, or phosphorous, and an alkenyl succinic acid of at least 10 carbon atoms. No. 2,157,873. Adrianus Johannes van Peski and Franz Rudolf Moser, Amsterdam, Netherlands, to Shell Development Co., San Francisco, Calif.

Vulcanizer for rubber, comprising an arylene-thiazyl-2-thio derivative of a dioxane or its sulfur analog. No. 2,158,019. Albert M. Clifford, Stow, Ohio, to Wingfoot Corp., Wilmington, Del.

Vulcanizers for rubber, comprising arylene-thiazyl-2-thio derivatives of a dioxane or its sulfur analog. Nos. 2,158,021-2. Joy G. Lichty, Stow, Ohio, to Wingfoot Corp., Wilmington, Del.

A self-preservative acid food product, of semi-solid consistency, prepared by the addition of lactic acid to a processed distillers' slop. No. 2,158,043. William P. M. Grelck, Baltimore, Md.

Coal Tar Chemicals

Preparation aracyl persulfides. No. 2,154,488. William Braker, Brooklyn, N. Y., to E. R. Squibb & Sons, New York City.

Preparation diazo-sulfonic acid esters. No. 2,154,509. Jean G. Kern, East Aurora, N. Y., to National Aniline and Chemical Co., Inc., New York City.

Preparation ethers of alkyl esters of hydroxy-benzoic acids, especially

U. S. Chemical Patents
Off. Gaz.—Vol. 501, Nos. 3, 4—Vol. 502, Nos. 1, 2—p. 104

U. S. Chemical Patents

Off. Gaz.—Vol. 501, Nos. 3, 4—Vol. 502, Nos. 1, 2—p. 105

benzyl salicyl ether derivatives. No. 2,154,598. Shailer L. Bass, and Edward M. Van Duzee, deceased, by Clarence H. Macomber, administrator, to The Dow Chemical Co., all of Midland, Mich.

Preparation of polynuclear aryl thio-isatins. No. 2,154,709. Alvin J. Sweet, East Aurora, N. Y., to National Aniline & Chemical Co., Inc., New York City.

Preparation of a polynuclear 4-hydroxy-hydropyrimidine. No. 2,154,-889. Willy Braun, Mannheim, and Karl Koeberle, Ludwigshafen-on-the-Rhine, Germany, to General Aniline Works, Inc., New York City.

Manufacture of a 3-alkoxy-4-hydroxy-benzaldehyde. No. 2,154,979. Christo Nikoloff Geneff, Sofia, Bulgaria.

Preparation of alpha-alkylamino-acylophenones. No. 2,155,194. Jonas Kamlet, Brooklyn, N. Y.

A new N-substituted 2-amino nitro-phenol. No. 2,155,356. Edgar C. Britton and Clarence L. Moyle, to The Dow Chemical Co., both of Midland, Mich.

Preparation a 6-chloro-N-alkyl-pyrazolanthrone. No 2,155,364. Melvin A. Perkins, Milwaukee, and Clifford E. Carr, South Milwaukee, Wis., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Preparation 6-halogeno-1, 9-pyrazolanthrones. No. 2,155,369. Myron S. Whelen, Milwaukee, Wis., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Method preparing diazo-dinitro-phenol. No. 2,155,579. Leon W. Babcock, Kenvil, N. J., to Hercules Powder Co., Wilmington, Del.

Preparation a 1-amino-2-nitro-4-acylamino-anthraquinone. No. 2,155,-673. Alfred Miller, Orchard Park, N. Y., to National Aniline & Chemical Co., Inc., New York City.

Preparation 2-methylallyl cinnamate. No. 2,155,856. Edgar C. Britton and Clarence L. Moyle, Midland, Mich., to Dow Chemical Co., Midland, Mich.

Process for preparation 2-substituted imidazolines. Nos. 2,155,877-8. Edmund Waldmann, Klosterneuburg, and August Chwala, Vienna, Austria to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Method preparation heterocyclic azo compounds, comprising the diazotization of an amino-substituted aryl hydrocarbon compound and coupling said product with a 3, 5-diamino pyridine. No. 2,156,141. Arthur Binz, Berlin-Wilmersdorf, and Otto von Schickh, Berlin, Germany, to Schering Aktiengesellschaft, Berlin, Germany.

Preparation derivatives of N-phenyl arylamines. Nos. 2,156,792-3. Arthur M. Neal and George C. Strouse, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Preparation derivatives of alpha-hydroxy-naphthoic acid. No. 2,156,-821. Wilhelm Schneider, Essau, Anhalt, Germany, to Agfa Ansco Corp., Binghamton, N. Y.

Preparation alkyl ethers of meta-phenyl-phenol. No. 2,157,071. Gerald H. Coleman and Garnett V. Moore, to The Dow Chemical Co., all of Midland, Mich.

Manufacture of phthalic anhydride, by catalytic oxidation of naphthalene vapor over a heavy metal catalyst. No. 2,157,965. Alfred Pongratz, Graz, Germany, to Helmuth Reichhold, Detroit, Mich.

Coatings

Manufacture a film-and drier-color-stable varnish composition, a heat-treated mixture of drying oil and oxalic acid-catalyzed diphenylol-substituted hydrocarbon-acetaldehyde resins. No. 2,155,907. John B. Rust, Orange, N. J., to Ellis-Foster Company, a corp. of New Jersey.

Method of protecting water-soluble adhesive coatings of paper, cloth or the like, comprising the following steps: applying the adhesive coating to the paper or the like, in moist condition and then applying a film of metallic soap to the coating before it is dry, and drying the film-covered coating. No. 2,156,083. Harold R. Dalton, Ridgefield, N. J., to Postal Telegraph-Cable Co., N. Y. City.

Method coating wood to simulate a maple color, comprising the application of a mixture of nitrocellulose and a heat-modified rape seed oil. No. 2,156,694. Melvin W. Johnson, Nutley, N. J., to Pittsburgh Plate Glass Co., Allegheny County, Pa.

Method coating steel strips, by passage through appropriate molten baths in continuous dipping process. No. 2,156,331. Thomas B. Chace, Winnetka, Ill., to Clad Metals Industries, Inc., Chicago, Ill.

Process coating metal articles, with alloying metal in the molten state; both metals having melting points above 1000 deg. C. and above that of the eutectic. No. 2,156,262. Colin G. Fink and Pincus Deren, New York City.

Process converting fatty acid drying oils into a polymerized drying oil, wherein reaction is affected by application heat and elevated pressure (at least about 500 atm.). No. 2,155,009. Eric William Fawcett, Reginald Oswald Gibson, and Michael Willcox Perrin, Winnington, Northwich, Eng., to Imperial Chemical Industries, Ltd., of Great Britain.

Manufacture a wrinkling resin varnish, wherein phenol-formaldehyde resin, vegetable and fatty-acid drying oils, and phthalic anhydride are caused to combine, under action of heat. No. 2,154,954. Howard R. Moore, to New Wrinkle, Inc., both of Dayton, Ohio.

Adhesive linoleum, comprising an alcoholic emulsion of soft and hard resin, alkali resin soap, and various mineral substances. No. 2,154,872. Curt Schulein, Bopfingen, Wurttemberg, Germany.

Bright-dip for Cadmium, aqueous hydrogen peroxide and sulfuric acid, the former being in about four times the quantity of the latter. No. 2,154,455. Raymond J. Kepfer, Lakewood, Ohio, to E. I. du Pont de Nemours & Co., Wilmington, Del.

Bright-dip for zinc, aqueous hydrogen peroxide of pH between 0.5 and 3.5. No. 2,154,451. Richard O. Hull, Lakewood, Ohio, to E. I. du Pont de Nemours & Co., Wilmington, Del.

A bright-dip for Cadmium, and process thereof, comprising an aqueous solution of hydrogen peroxide also containing acid-reacting substances. Nos. 2,154,468-9. Floyd F. Oplinger, Niagara Falls, N. Y., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Coating composition, comprising a cellulose derivative and an iron ferro-cyanide blue pigment ground in the presence of a blown oil. No. 2,157,901. Robert T. Hucks, South River, N. J., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Method for making asphalt emulsions. No. 2,157,698. Arthur Ludwick Halvorsen, Staten Island, N. Y.

Process for coating articles by vaporization of an appropriate material at sub-atmospheric pressure. No. 2,157,478. Wilhelm Burkhardt, Berlin-Grunewald, and Rudolf Reinecke, Berlin-Lankwitz, Germany, to Bernhard Berghaus, Berlin-Lankwitz, Germany.

Free-flowing pigment coating suspensions, and method for manufacturing same. Nos. 2,157,378-9-80. Victor R. Abrams, East Orange, N. J., to Sulflo Corp. of America, a corp. of Georgia.

Fluid, film-forming coating material, comprising a cellulose ester in a solvent (M.W. greater than 80) for same; said solvent of such mixtures of volatile components that resultant film may be air-dried, and have the appearance and density of a thermoplastic body. No. 2,157,334. John R. Haines, to Detroit Macoid Corp., both of Detroit, Mich.

Coating for aluminum, comprising finely-divided graphite fixed on the aluminum surface with the assistance of an oxide-producing alkali silicate; resultant surface said to be self-lubricating. No. 2,157,155. Harold K. Work, Oakmont, and Charles J. Slunder, New Kensington, Pa., to Aluminum Co. of America, Pittsburgh, Pa.

Dyes, Stains, etc.

Preparation water-insoluble mono-azo dyestuffs from amino-naphthols. No. 2,154,837. Ernst Fischer, Offenbach-on-the-Main, Germany, to General Aniline Works, Inc., New York City.

Preparation mono-azo water-soluble dyestuffs from amino-naphthol sulfonic acids. No. 2,154,838. Erich Fischer and Walter Gmelin, Bad Soden in Taunus, Germany, to General Aniline Works, Inc., New York City.

Preparation of some triarylmethane keto-chlorides, as dyestuffs. No. 2,154,926. Paul Herbert Wolff, Frankfort-on-the-Main-Hochst, Friedrich Heim, Sindlingen, and Carl Winter and Ludwig Bettag, Ludwigshafen-on-the-Rhine, Germany, to General Aniline Works, Inc., New York City.

Manufacture dyestuffs by the condensation with phosgene of a substituted amino-anthraquinone with a yellow monoamino mono-azo dyestuff, the products yielding water-soluble green tints. No. 2,154,981. Hans Gubler and Eduard Bernasconi, to Society of Chemical Industry in Basle, Basel, Switzerland (both of Basel).

Preparation of sulfonated asymmetrical azo-dyestuffs containing at least two azo groups from a substituted p,p′-diamino diphenyl and a poly-substituted aromatic amido-compound. No. 2,155,001. Max Schmid, Riehen, Switzerland, to Society of Chemical Industry in Basle, Basel, Switzerland.

Dyeing process for vat and sulfur dyestuffs, comprising essentially the admixture of a small quantity of a hydroxylated polyamine condensation product of high molecular weight as a leveling agent. No. 2,155,-135. Valentin Kartaschoff and Jakob Link, to Chemical Works formerly Sandoz, both of Basel, Switzerland.

Anthraquinone vat dyestuffs, the condensation product of an amino-anthraquinone with one of the class anthraquinone-2,1-thiophene-2′-carbonyl chloride and anthraquinone-2,1-selenophene-2′-carbonyl chloride. No. 2,-155,359. Ralph N. Lulek, Waukesha, and Clarence F. Belcher, South Milwaukee, Wis., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Anthraquinone vat dyestuffs, the alkaline condensation products of 6-anthraquinonylamino-Bz-1 N-benzanthronylnaphtho-styrils, yielding neutral grays on cotton from an alkaline hydrosulfite bath. No. 2,155,360. Ralph N. Lulek, Milwaukee, and Clarence F. Belcher, South Milwaukee, Wis., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Manufacture a water-soluble polymethine dyestuff, yielding clear yellow shades on tannic acid-mordanted cotton. No. 2,155,447. Nikolaus Roh, Ludwigshafen-on-the-Rhine and Paul Wolff and Gustav Schaefer, Frankfort-on-the-Main-Hochst, Germany, to General Aniline Works, Inc., New York City.

Process manufacturing polymethine dyestuffs containing derivative groups of the radicle structure: 1,3,3-tri-methyl indoline. No. 2,155,459. Carl Winter and Nikolaus Roh, Ludwigshafen-on-the-Rhine, and Paul Wolff and Gustav Schaefer, Frankfort-on-the-Main-Hochst, Germany, to General Aniline Works, Inc., New York City.

Preparation some monoazo dyestuffs, principally derivatives of arylamino sulfonic acids, as those of naphthalene, pyrazolone, etc., and certain of their derivatives. No. 2,155,493. Arthur Howard Knight and Frank Lodge, Blackley, Manchester, Eng., to Imperial Chemical Industries, Ltd., of Great Britain.

Manufacture a class of aryl-azo dyestuff materials. No. 2,155,685. Swanie S. Rossander, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Manufacture mono-azo dyestuffs yielding on acetate silks tints of a green-blue color. No. 2,155,755. Friedrich Felix and Wilhelm Huber, to Society of Chemical Industry in Basle, all of Basel, Switzerland.

Aromatic organic dyestuff, a diazo-imino compound. No. 2,155,942. Jean G. Kern, East Aurora, N. Y., to National Aniline and Chemical Co., Inc., New York City.

Preparation a sulfur dye from a thionated p-hydroxy-diphenylamine; and process for applying same to textile fibres. No. 2,156,071. George Clifford Strouse, East Aurora, N. Y., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Dye solution for cast phenolic shapes, including water, a spirit-soluble basic dye, a dye solvent, and an alkaline mixture of sodium phosphates. No. 2,156,442. Robert O. Wood, Montclair, N. J., to Dipol Process Co., Rochester, N. Y.

Manufacture dyestuffs from 2-acyl-amino-5-hydroxynaphthalene-1,7-disulfonic acids. No. 2,156,593. Adolf Krebser, Riehen, near Basel, Switzerland, to J. R. Geigy S. A., Basel, Switzerland.

Manufacture poly-azo dyestuffs yielding brown tints on cotton, viscose rayon, and leather; same, applied to union fabric of cotton and acetate silk leave the latter undyed. No. 2,156,597. Bertram Mayer and Ernst Alfred Henzi, to Society of Chemical Industry in Basle, all of Basel, Switzerland.

Water-insoluble azo dyestuff, developed dye class, yielding green, olive, and brown shades. No. 2,156,731. Max Lange, Frankfort-on-the-Main, and Theodore Jacobs, Wiesbaden, Germany, to General Aniline Works, Inc., New York City.

Preparation certain dyestuffs of the anthraquinone series. No. 2,-156,887. Clause Weinand, Leverkusen I.G. Werk, Germany, to General Aniline Works, Inc., New York City.

Preparation polyazo dyestuffs from a polybasic naphthalamine nucleus. No. 2,157,295. Heinrich Lier, to Chemical Works, formerly Sandoz, both of Basel, Switzerland.

Preparation vat dyestuffs containing a pyrene-nuclear group. No, 2,157,-341. Walter Kern, Sissach, Switzerland, to Society of Chemical Industry in Basle, Basel, Switzerland.

Manufacture mono-azo dyes of the xanthrone series. No. 2,157,431. Pierre Petitcolas, Rouen, France, to Compagnie Nationale de Matieres Colorantes et Manufactures de Produits Chimiques du Nord, Reunies, Etablissements Kuhlman, Paris, France.

A dihydroxy-dicarboxy fluoran dyestuff. No. 2,157,667. Paul W. Jewel and John R. Pratt, to Max Factor & Co., all of Los Angeles, Calif.

An azo dyestuff having as a nuclear residue an alkyl-aryl sulfone. No. 2,157,725. Werner Zerweck and Wilhelm Kunze, Frankfort-on-the-

Main-Fechenheim, Germany, to General Aniline Works, Inc., New York City.

Aromatic dye intermediates for water-insoluble azo dyestuffs. Nos. 2,-157,796-7. Friedrich Muth, Leverkusen-I. G. Werk, Germany, to General Aniline Works, Inc., New York City.

Manufacture of some tetrakisazo dyestuffs. No. 2,157,876. Hermann Winkeler, Ludwigshafen-on-the-Rhine, and Albert Petz, Mannheim, Germany, to General Aniline Works, Inc., New York City.

Manufacture some disazo dyestuffs. No. 2,157,877. Hermann Winkeler, Ludwigshafen-on-the-Rhine, and Albert Petz, Mannheim, Germany, to General Aniline Works, New York City.

Preparation vat dyestuffs of the anthraquinone series. No. 2,157,991. Walter Mieg and Franz Wieners, Opladen, and Willy Burneleit, Cologne, Rhine, Germany, to General Aniline Works, New York City.

Production symmetrical thioindigo dyes. No. 2,158,032. Herbert August Lubs, Wilmington, Del. and Alfred J. Johnson, Woodstown, N. J., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Explosives

Preparation of pentaerythritol tetranitrate, an explosive sensitive to low friction. No. 2,154,552. Joseph A. Wyler, to Trojan Powder Co., both of Allentown, Pa.

Water-proof explosive material; sodium chlorate admixed with resinous mixed esters of a polyhydric alcohol, a polycarboxylic acid, and a fatty acid of at least 6 carbon atoms. No. 2,155,499. Walter E. Lawson, Woodbury, N. J., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Primer, comprising an active ingredient unstable in the presence of alkali and ground glass of substantially neutral reaction. No. 2,156,942. George B. Hatch, Pittsburgh, Pa., to Western Cartridge Co., East Alton, Ill.

Priming mixture, of an oxidant, a fuel ingredient, and a heavy-metal chromite catalyst. No. 2,157,669. Wilbur A. Lazier, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Fine Chemicals

Preparation a therapeutic lanolin sol. No. 2,154,432. Garth Wilkinson Boericke and William Wallace Young, to J. C. Shay, Inc., all of Philadelphia, Pa.

Diazo derivatives of guanyl-urea-N-sulfonic acids and of N-nitroguanyl-ureas. No. 2,154,470. Robert Prescott Parker, Somerville, N. J., to Calco Chemical Co., Somerset, N. J.

Preparation pure benzoic acid. No. 2,154,626. Wilhelm Koch, Ludwigshafen-on-the-Rhine, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Photographic silver halide emulsion, containing gelatin and a compound of the class consisting of an aliphatic aldehyde carboxylic acid and a like acid having a hydroxy-, keto-, or amino substituent. No. 2,154,895. Hans Fricke, Wolfen, Kreis Bitterfeld, and Johannes Brunken, Dessau, Germany, to Agfa Ansco Corp., Binghamton, N. Y.

Production dyestuffs of the phthalo-cyanine series, comprising the reaction of an aromatic dinitrile with sodium cyanamide, with heat. No. 2,154,912. Fritz Muehlbauer and Georg Niemann, Ludwigshafen-on-the-Rhine, Germany, to General Aniline Works, Inc., New York City.

A color-forming compound for photographic use, a pyridine-substituted ketone, the other member being of the group consisting of alkyl, aryl, and alkaryl residues. No. 2,154,918. Wilhelm Schneider and Hans Loleit, to Agfa Ansco Corp., Binghamton, N. Y.

Preparation imino-substituted imidazolines. No. 2,154,922. Edmund Waldmann, Klosterneuburg, and August Chwala, Vienna, Austria, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Preparation purified bee-venom from the stings and poison glands. No. 2,154,934. Georg Hahn, Frankfort-on-the-Main, Germany.

Preparation of metal-free phthalocyanines, by reaction of an ortho-arylene dicyanide with an ethanolamine. No. 2,155,054. Arthur Reginald Lowe, Blackley, Eng., to Imperial Chemical Industries Ltd., of Great Britain.

Electrolyte for non-aqueous media, comprising essentially the reaction product of an amine and glacial acetic acid, having a moderately basic reaction. No. 2,155,086. Alexander M. Georgiev, Dayton, Ohio, to General Motors Corp., Detroit, Mich.

Hexylresorcinol capsule, having a solid hexyl resorcinol center coated with a thin layer of inert material such as starch, and hermetically sealed in a tough, continuous adherent layer of soluble elastic material of substantially uniform thickness. Also, process for manufacturing same. Nos. 2,155,444-5. Paul S. Pittenger and John W. Jester, to Sharp & Dohme, Inc., both of Philadelphia, Pa.

Process producing beta- methylcholine ethers, and their corresponding quarternary ammonium salts of dimethylamine. No. 2,155,446. Georg Roeder, to Merck & Co., Inc., both of Rahway, N. J.

A silver halide emulsion containing a dye of a group comprising heterocyclic aralkyl secondary amines from a p,p'-diamino benzene base coupled with a heterocyclic organical having sulfur, selenium, or alkenyl molecules as primary members of the cyclic structure. No. 2,155,475. Walter Dieterle, Dessau, Germany, to Agfa Ansco Corp., Binghamton, N. Y.

Photographic treating solution containing a stabilizer from the group consisting of certain derivatives of acridine. No. 2,155,501. Georg L. Maiser, Dessau, Germany, to Agfa Ansco Corp., Binghamton, N. Y.

Preparation of some derivatives of iso-alloxazine, having vitamin-like properties. No. 2,155,555. Paul Karrer, Zurich, Switzerland, to Hoffmann-La Roche, Inc., Nutley, N. J.

Preparation organic mercury compounds. No. 2,155,922. Carl N. Andersen, Wellesley Hills, Mass., to Lever Brothers Co., a corp. of Maine.

Method reduction carbonylic compounds with methanol, producing the corresponding alcohols. No. 2,156,217. Chester E. Andrews, Overbrook, and Merrell R. Fenske, State College, Pa., to Rohm & Haas Co., Philadelphia, Pa.

Preparation an ergot derivative free of the known ergot alkaloids. No. 2,156,242. Morris S. Kharasch and Romeo Ralph Legault, Chicago, Ill., to Eli Lilly & Co., Indianapolis, Ind.

Preparation pregnanolones from 3-hydroxy-bisnorcholanic acids. No. 2,156,275. Adolf Butenandt, Danzig-Langfuhr, Free City of Danzig, and Friedrich Hildebrandt, Hohen Neuendorf, near Berlin, Germany.

Preparation to stabilize and sensitize silver halide emulsions, substituted carbocyanine salts having a meso-thioalkyl substituent. No. 2,156,464. Otto Fritz Schulz, Berlin-Wilmersdorf, Germany.

Preparation acyloxy mercury urethanes. No. 2,156,598. Karl Miescher, Riehen and Karl Hoffman, Basel, Switzerland, to Society of Chemical Industry in Basle, Basel, Switzerland.

Manufacture estradiol-3 esters. No. 2,156,599. Karl Miescher, Riehen, and Caesar Scholz, Basel, Switzerland, to Society of Chemical Industry in Basle, Basel, Switzerland.

Photographic developer, comprising aqueous dispersion of unoxidized metal, a colloidal silver halide, and a protective colloid. No. 2,156,626. Garnet P. Ham, Old Greenwich, Conn., to American Cyanamid Co., New York City.

Process for producing heavy water. No. 2,156,851. Fritz Hansgirg, Konan, Korea.

Preparation a germicidal tert-amyl ortho-cresol. No. 2,157,014. George W. Raiziss and Le Roy W. Clemence, Philadelphia, Pa., to Abbott Laboratories, North Chicago, Ill.

Preparation xyloseen-1,2 -tribenzoates. No. 2,157,137. Randolph T. Major, Plainfield, N. J., and Elmer W. Cook, New York City, to Merck & Co., Inc. Rahway, N. J.

Photographic dye, the condensate of dihydroxy-diphenyl sulfide with benzotrichloride. No. 2,157,351. Wilhelm Schneider and Ernst Bauer, Dessau-in-Anhalt, Germany, to Agfa Ansco Corp., Binghamton, N. Y.

Manufacture 1,4-ethylenic glycols. No. 2,157,365. Thomas H. Vaughn, Niagara Falls, N. Y., to Carbide and Carbon Chemicals Corp., a corp. of N. Y.

Non-explosive photographic film base. No. 2,157,384. Joseph G. Davidson, Scarsdale, N. Y., to Carbide and Carbon Chemical Corp., a corp. of N. Y.

Process reducing nitrohydroxy-aliphatic compounds, with catalytic hydrogenation, to corresponding amines. No. 2,157,386. Kenneth Johnson, Terre Haute, Ind., to Purdue Research Foundation, La Fayette, Ind.

Method for hydrogenation of ketones to obtain the corresponding alcohols. No. 2,158,040. Joseph Blumenfeld, Paris, France.

Glass

Apparatus for drawing pipes from molten quartz or glass of high silicic acid content. No. 2,155,131. Walter Hanlein, Berlin-Spandau, Germany, to Patent-Treuhand-Gesellschaft fur Elektrische Gluhlampen m.b.H., Berlin, Germany.

Laminated glass, fabricated from glass sheet and a polyvinyl resiniferous material. No. 2,155,142. Howard W. Matheson, Montreal, Quebec, Canada.

Process manufacture water-white aqueous caustic soda from glass plant by-products. No. 2,155,252. Brazier K. Beecher, Barberton, and William F. Waldeck, Wadsworth, Ohio, to Pittsburgh Plate Glass Co., a corp. of Pennsylvania.

Glass-making composition, containing silica, soda, and a lime component previously calcined with 0.1-1.0% of available boron oxide. No. 2,155,721. Harley C. Lee, Columbus, Ohio, to Society for Savings in the City of Cleveland, Cleveland, Ohio.

Process manufacturing laminated safety glass, employing vinyl acetal resin as the interposed binder. No. 2,156,680. Brook J. Dennison, Aspinwall, Pa., to Pittsburgh Plate Glass Co., Allegheny County, Pa.

Method of, and apparatus for, separating laminated glass sheets. No. 2,156,688. Frank W. Hall, Tarentum, Pa., to Pittsburgh Plate Glass Co., Allegheny County, Pa.

Method for spinning glass filaments. No. 2,156,982. Charles G. Harford, Wollaston, Mass., and Earl Stafford, Philadelphia, Pa., to Arthur D. Little, Inc., a corp. of Mass.

Industrial Chemicals

Process converting starch, comprising the heating of starch in the air-dry state to about 130 deg. C. without destroying the starch structure, adding 2-5% urea and increasing the temperature until latter melts and materially decomposes, a starch conversion product resulting that is dispersable in water at ordinary temperatures without substantial granular disorganization. No. 21,057. Reissue. George V. Caesar, Dongan Hills, Staten Island, to Stein, Hall & Co., Inc., New York City.

Method manufacturing a crude pectate pulp. Reissue. No. 21,077. Clarence Walter Wilson, Norco, Calif., to California Fruit Growers Exchange, Los Angeles, Calif.

Method preparation alkali salts of silica and alumina by an electrofusion process. No. 2,154,439. Anders E. A. S. Cornelius, Baltimore, Md., to Crown Cork & Seal Corp., of New York.

Control plasticity of hydrogenated glycerides, comprising the addition of a nearly saturated completely solid fat having acid radicals of the same number of carbon atoms as those in the hydrogenated fat which have the greater number of carbon atoms. No. 2,154,452. Leslie G. Jenness, Brooklyn, N. Y., to Intermetal Corp., Newark, N. J.

Method cooling, as of refrigeration, involving the use of salts of negative heat of solution. No. 2,154,473. Peter Schlumbohm, New York, N. Y.

Chewing gum base, incorporating prolamine homogeneously distributed throughout the crude material. No. 2,154,482. Harry M. Weber, West Englewood, N. J., to Prolamine Products Inc., Dover, Del.

Apparatus and process for the catalytic synthesis of hydrocarbon products at high temperature and pressure, comprising vapor phase hydrogenation of combustible carbon compounds over fluoride-activated siliceous material. No. 2,154,527. Mathias Pier, Heidelberg, and Walter Simon and Paul Jacobs, Ludwigshafen-on-the-Rhine, Germany, to Standard-I. G. Co., Linden, N. J.

Feeder and sampler apparatus for liquid chemical materials. No. 2,154,529. Gwynne Raymond, Oklahoma City, Okla.

Method of, and apparatus for, the separation of ethylene from ethane-methane-hydrogen admixtures. No. 2,154,668. William Lane De Baufre, Lincoln, Nebraska.

Method for preparing calcium chloride lumps from the molten salt and process for molding materials from said chloride. Nos. 2,154,671-2. Charles R. Downs, Old Greenwich, Conn., and Joseph W. Spiselman, Brooklyn, N. Y., to Calorider Corp., Greenwich, Conn.

Apparatus for the manufacture of formed calcium chloride hydrate shapes. No. 2,154,708. Joseph W. Spiselman, Mamaroneck, N. Y. and Charles R. Downs, Old Greenwich, Conn., to Calorider Corp., Greenwich, Conn.

Method for the continuous extraction of ethereal oils from their admixtures, comprising essentially the selective action of solvents tending to take up material of like dipole moment. No. 2,154,713. Willem Rhijnvis van Wijk, Amsterdam, and Willem Johannes Dominicus van Dijck, The Hague, Netherlands, to Shell Development Co., San Francisco, Calif.

U. S. Chemical Patents

Off. Gaz.—Vol. 501, Nos. 3, 4—Vol. 502, Nos. 1, 2—p. 107

Continuous process for the manufacture of refined asphalt. No. 2,154,746. Jacob Benjamin Heid, to Universal Oil Products Co., both of Chicago, Ill.

Process refining bituminous oil. No. 2,154,820. Ernest A. Ocon, New York City.

Design for a mercury-cathode electrolytic cell. No. 2,154,830. Franz Bencker, Leverkusen-I. G. Werk, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Process and apparatus for hydrolyzing oils and fats, wherein an aqueous stream of material is forced through a reaction coil with an extrusive pressure of at least 2,500 lbs., at a temperature in the range 260-320 deg. C. No. 2,154,835. Gustav W. Eisenlohr, Wyoming, Ohio, to The M. Werk Company, St. Bernard, Ohio.

An apparatus for the analysis of combustion exhaust gases. No. 2,154,862. Dimitry E. Olshevsky, to Eclipse Aviation Corp., both of East Orange, N. J.

Bitumen preservative, comprising a fatty residual pitch containing small amounts of a water-soluble alkali alkyl sulfate, which is dissolved in an appropriate solvent to make an approximately 6% solution. No. 2,154,873. Orvall Smiley, Springfield, Ill.

Manufacture crystalline hydrates of sodium hydrosulfide, wherein an aqueous solution of sodium sulfide is treated with hydrogen sulfide, and the step performed again with additional addition of solid sulfide and sulfide gas under reflux at about 150 deg. C.; on cooling to about 80 deg. C., crystals of the desired hydrates separate out. No. 2,154,917. Johann Schneider, Wolfen, Kreis Bitterfeld, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-am-Main, Germany.

Purification of glycerine, wherein the anhydrous distilled material is extracted with iso-octane at 80-150 deg. C.; the separated raffinate phase is fractionated to yield a decolorized glycerol. No. 2,154,930. Theodore Evans, Berkeley, Calif., to Shell Development Co., San Francisco, Calif.

Method of, and apparatus for decolorizing clays, comprising electrolysis of an aqueous clay suspension containing an electrolyte capable of generating nascent medium reducing ferric iron coloring matter. No. 2,154,948. Sanford C. Lyons, Bennington, Vt., to Bird Machine Co., Walpole, Mass.

Process for treating spent olefine-removing mineral acid liquors, wherein the acid alkyl esters are removed by extraction with a water-insoluble organic solvent. No. 2,155,027. Anton Johan Tulleners, Amsterdam, Netherland, to Shell Development Co., San Francisco, Calif.

Resiniferous ferric sulfate, prepared by drum-drying of a heat-concentrated solution of the salt, such that the product comprises a water-soluble solid, a glass-like, dry, partially hydrated ferric sulfate, in an essentially normal, highly soluble form. No. 2,155,069. William S. Wilson, Brookline, and John F. White, Somerville, Mass., to Monsanto Chemical Co., of Delaware.

Process manufacturing rock wool, comprising essentially the forming of a charge of a mixture, consisting of Portland cement clinker and siliceous acid rock material, whose ratio varies between 10:4 and 10:30 respectively; clinkers to contain about 66% lime, rock about 90% silica, with both containing various smaller quantities of magnesia, alumina, and iron oxide. No. 2,155,107. Waldo E. Tyler, Kansas City, Mo., and Paul R. Chamberlain and Russ A. Loveland, Dewey, Okla., to Dewey Portland Cement Co., Kansas City, Mo.

Continuous process for the production of alcohol from fermented sugar liquors. No. 2,155,134. Walter Karsch, Tornesch, Germany, to Deutsche Reich, Reichsmonopolverwaltung fur Branntwein, Berlin, Germany.

Process preparing lime-free mixtures of magnesia and calcium carbonate from dolomite. No. 2,155,139. Walter H. MacIntire, Knoxville, Tenn., to American Zinc, Lead & Smelting Co., St. Louis, Mo.

Emulsifying agent prepared by the saponification of a resiniferous extract of pine wood, the latter being the residue on extracting wood chips with a petroleum solvent, said extract being substantially insoluble in naphtha and having a melting-point of about 115 deg. C., and acid no. about 100. No. 2,155,141. Cornelis Maters, Rotterdam, and Martinus Johannes Riemersma, Wassenaar, Netherlands, to Hercules Powder Co., Wilmington, Del.

Continuous process, and apparatus thereof, for manufacturing sulfur dioxide from sulfuric acid sludges from petroleum refining processes. No. 2,155,200. Henry F. Merriam, West Orange, N. J., to General Chemical Co., New York City.

Cream-whipping process, wherein cream is charged with gas under pressure, said gas composed of 15-25% carbon dioxide, not over 40% nitrogen; before releasing gas, cream to have pH not more acid than 5.5. No. 2,155,260. Isaac M. Diller, Brooklyn, N. Y.

Process for separation sodium chloride from aqueous caustic soda admixed with same. No. 2,155,269. James L. Jamieson, Barberton, Ohio, to Pittsburgh Plate Glass Co., Allegheny County, Pa.

Method preparation chlorine monoxide, wherein chlorine gas is oxidized over mercuric oxide. No. 2,155,281. Irving E. Muskat, Akron, and George H. Cady, Wadsworth, Ohio, to Pittsburgh Plate Glass Co., Allegheny County, Pa.

Apparatus for manufacture aqueous hydrogen fluoride from the anhydrous acid. No. 2,155,315. Harry C. Kremers, Cleveland Hts., O., to Harshaw Chemical Co., Elyria, O.

Pectin dispersion, prepared by reacting pectins with a water-soluble nickel salt in such quantity that amount of nickel present will be from 0.10 to 1.00% of the weight of combined nickel and pectin. No. 2,155,361. Philip Bliss Myers, Scarsdale, N. Y., to Sardik, Inc., Jersey City, N. J.

Process and apparatus for manufacture malto-dextrine. No. 2,155,374. Louis N. Hartog, New York City.

Manufacture a dry, solid protein composition comprising, in intimate association, the dried residue of a homogeneous liquid containing animal-blood hemoglobin, and animal milk casein. No. 2,155,417. Carroll L. Griffith, to The Griffith Laboratories, Inc., both of Chicago, Ill.

Process manufacturing a formed artificial cork from granulated cork material admixed with fluid binder comprising dispersed rubber and a heat-irreversible egg and/or blood albumen; shaped material is obtained by heat-coagulation of the material in a mold. No. 2,155,429. Michael Levin, Buffalo, N. Y., four-tenths to Jacob T. Basseches, New York City.

A composition gasket, comprising a fibrous base admixed with polymerized chloro-butadiene and bodied tung oil. No. 2,155,457. William M. West, to Crown Cork & Seal Co., both of Baltimore, Md.

Process manufacturing alkaline metal salts by base exchange over zeolite; essentially, method comprises solution of calcined magnesia in carbonic acid solution under pressure of carbon dioxide, and passing said solution under said pressure through alkaline zeolite. No. 2,155,477. Maxence Drujon, Aix-en-Provence, France.

Process and apparatus for production volatile organic esters. No. 2,155,625. Ewald von Retze, Schonberg, near Kronberg, Germany, to Deutsche Gold und Silber-Scheideanstalt, Frankfort-on-the-Main, Germany.

Apparatus for concentrating sulfuric acid solutions. No. 2,155,633. John Bachi, Whiting, Ind., to Standard Oil Co., Chicago, Ill.

Method odorizing gaseous hydrocarbon fuel. No. 2,155,663. Lebbeus C. Kemp, Port Arthur, Texas, to The Texas Company, New York City.

Stabilization peroxides by treating their solutions with silica gel, then removing latter from said solutions. No. 2,155,704. Arthur Watson, Goodall and Oswald Hugh Walters, Runcorn, Eng., to Imperial Chemical Industries, Ltd., of Great Britain.

Preparation addition compound from sodium perborate and urea. No. 2,155,717. Fritz Kuhnle, Gotha, Germany, to E. I. du Pont de Nemours & Co., Wilmington, Del.

Stabilizer for trichlorethylene, a compound from the group consisting of p-tert-butyl and p-tert-amyl phenols. No. 2,155,723. Arthur A. Levine and Oliver W. Cass, Niagara Falls, N. Y., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Preparation sulfated aliphatic ethers. No. 2,155,899. Benjamin R. Harris, Chicago, Ill., to Colgate-Palmolive-Peet Company, Jersey City, N. J.

Preparation a bleaching and sterilizing agent, by reacting nitrogen trichloride with ammonia; former constituent prepared by electrolysis aqueous solution containing ammonium and chloride ions. No. 2,155,914. Gerrit van der Lee, to Naamlooze Vennootschap Industrieele Maatschappij Voorheen Noury & Van Der Lande, both of Deventer, Netherlands.

Preparation a water-insoluble metal salt of a sulfonated condensate of a terpene and a phenol. No. 2,155,961. William W. Trowell, to Hercules Powder Co., both of Wilmington, Del.

Process for chlorination methane and its homologs. No. 2,156,039. Karl Dachlauer, Hofheim-on-the-Taunus, and Erwin Schnitzler, Frankfort-on-the-Main-Hochst, Germany, to I. G. Farbenindustrie Aktiengesellschaft Frankfort-on-the-Main, Germany.

Process separating tertiary olefines from gaseous admixtures, comprising the saturation with hydrogen halide of these olefines, in the presence of an alkaline halide of the group of barium and magnesium. No. 2,156,070. Georg Stern, Neckargemund, and Wilhelm Friedrichsen, Ludwigshafen-on-the-Rhine, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Preparation vinyl esters, comprising the reaction of acetylene with mono-alkanoic acids other than acetic acid, in the presence of a mercury compound, with addition of borontrifluoride-acetic acid. No. 2,156,093. Heinrich Lange and Otto Dorrer, Frankfort-on-the-Main-Hochst, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Condensation products of hydrogen sulfide with acetylene, and process preparing same. No. 2,156,095. Walter Reppe and Fritz Nicolai, Ludwigshafen-on-the-Rhine, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Apparatus for demulsifying and settling liquids. No. 2,156,123. Walter M. Mount, Tulsa, Okla.

Preparation chlorides of higher alkanoic acids by reaction same with phosgene in presence of charcoal, in the temperature range 100 to 250 deg. C. No. 2,156,177. Alfred Dierichs, Leverkusen-Wiesdorf, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Process manufacturing synthetic pectin, from lactones of uronic acids that have been polymerized in vacuo in the presence of a finely-divided metal. No. 2,156,223. Philip Bliss Myers, Scarsdale, N. Y., to Sardik, Inc., Jersey City, N. J.

Process producing partial oxidation products from petrolatum waxes of high molecular weight. No. 2,156,266. Eger V. Murphree and Edward D. Reeves, Baton Rouge, La., to Standard Oil Development Co., a corp. of Delaware.

Process and apparatus for manufacture ammonium bifluoride. No. 2,156,273. Abe R. Bozarth, Cleveland, Ohio, to The Harshaw Chemical Company, Elyria, Ohio.

Apparatus and process for applying a wet cement composition to a roofing base or the like. No. 2,156,286. Norman P. Harshberger, Scarsdale, N. Y., to Bakelite Building Products Co., Inc., New York City.

Preparation monomeric cyclic amides. No. 2,156,300. Arnold L. Lippert, Wilmington, Del., and Ebenezer E. Reid, Baltimore, Md., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Method for manufacturing asbestos-cement shingles, and the like. No. 2,156,310. Charles Schuh, Brooklyn, N. Y., to Bakelite Building Products Co., Inc., a corp. of Delaware.

Process manufacturing ethylene oxide, by contact-catalysis of ethylene and an oxygen-containing gas; resultant oxide recovered on activated carbon. No. 2,156,341. Herbert Langwell, Windmill, Eng., Epsom, and Herbert Muggleton Stanley, Tadworth, Eng., to Carbide and Carbon Chemicals Corp., a corp. of N. Y.

Method concentration of aqueous fatty acid solutions. Nos. 2,156-344-5-6. Herbert E. Martin, Cumberland, Md., to Celanese Corp. of America, a corp. of Delaware.

Process separating phenol and hydrogen chloride from the mixture of vapors produced by the catalytic decomposition in the vapor phase of chlorbenzene and water. No. 2,156,402. Walter Prahl, to F. Raschig G.m.b.H., both of Ludwigshafen-on-the-Rhine, Germany.

Method introducing active metals into electron discharge device. No. 2,156,414. Delos H. Wamsley, West Caldwell, N. J., to Radio Corp. of America, New York City.

Method manufacturing a dextrinized starch, by dehydration starch in vacuo, then introducing a water-immiscible liquid, the treated material then being heated in an oil to a starch dextrinizing temperature. No. 2,156,488. Harold E. Bode, Chicago, Ill., to Corn Products Refining Co., New York City.

Manufacture of carburized silica, wherein diatomaceous earth is admixed intimately with coal-tar, the mass being ignited in the absence of air, such that the carburized silica and recoverable distillates are the chief products. No. 2,156,591. Carl Alfred Jacobson, Morgantown, W. Va., to Sealco By-Products Co., Bluefield, W. Va.

Manufacture calcium arsenate. No. 2,156,595. Axel Rudolf Lindblad, Stockholm, and Anders Gustav Paul Palen, Saltsjobaden, Sweden, to Bolidens Gruvaktiebolag, Stockholm, Sweden.

Purification of acid-contaminated carboxylamides. No. 2,156,642. Harold Slagh, to The Dow Chemical Co., both of Midland, Mich.

Device for gas testing, comprising essentially a sensitive electrolytic cell. No. 2,156,693. Moses G. Jacobson, Swissvale, Pa., to Mine Safety Appliances Co., Pittsburgh, Pa.

Process oxidizing halogenated ketones to carboxylic derivatives. No. 2,156,721. Martin de Simo and Sumner H. McAllister, Berkeley, Calif., to Shell Development Co., San Francisco, Calif.

U. S. Chemical Patents

Preparation an aliphatic trisecondary triether of a trihydric alcohol. No. 2,156,724. Theodore W. Evans, Berkeley, and Edwin F. Bullard, Oakland, Calif., to Shell Development Co., San Francisco, Calif.

Preparation octadecadiene acid. No. 2,156,737. Remmet Priester, to Naamlooze Vennootschap Noury & Van Der Lande's Exploitatiemaatschappij, both of Deventer, Netherlands.

Process production sulfur dioxide, by reaction of sulfur vapor with sulfur trioxide gas. No. 2,156,791. Albert C. Mohr, Berkeley, Calif., to Stauffer Chemical Co., a corp. of California.

Manufacture friction bodies, comprising a binding agent of hardened resin, the condensates of polybasic alcohols and acids, and natural resin acids, and appropriate friction-producing materials. No. 2,156,828. Karl Wolf, Ludwigshafen-on-the-Rhine, and Hans Scheuermann, Oggersheim, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Method recovery ammonia from ammoniacal liquors. No. 2,156,843. John C. Garrels and Howard Roderick, Grosse Ile, Mich., to Michigan Alkali Co., Wyandotte, Mich.

Continuous countercurrent process for the hydrolysis of fats. No. 2,-156,863. Victor Mills to The Proctor & Gamble Co., both of Cincinnati, Ohio.

Method and apparatus for feeding and distributing a sludgy material to a surface. No. 2,156,901. Thomas Brady, Bloomfield, N. J., to Bakelite Building Products Co., Inc., New York City.

Method manufacturing sulfurized terpene oils. No. 2,156,919. Henry F. Merriam, West Orange, N. J., and George W. Cupit, Jr., Massapequa Park, N. Y., to General Chemical Co., New York City.

Manufacture hexene from divinylacetylene. No. 2,156,936. William Stansfield Calcott, Woodstown, N. J., Albert S. Carter, Wilmington, Del., and Frederick B. Downing, Carneys Point, N. J., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Detergent and wetting agents comprising essentially water-soluble alkyl sulfates having 8 to 18 carbon atoms in the alkyl radicle. No. 2,156,996. Wilfred S. Martin, Norwood, Ohio, to The Proctor & Gamble Co., Cincinnati, Ohio.

Preparation phenylmercuric glycollate, and like compounds. Nos. 2-157,009-10. Ralph P. Perkins, to The Dow Chemical Co., both of Midland, Mich.

Thermohydrometer for reading directly temperature-corrected specific gravities. No. 2,157,063. Julian A. Wesseler, Crestwood, N. Y., to Commercial Solvents Corp., Terre Haute, Ind.

Process refining glyceride oils. No. 2,157,069. Benjamin Clayton, Houston, Texas, to Refining, Inc., Reno, Nev.

Method treating battery electrode elements. No. 2,157,072. Albert I. Eddy, Hillside, N. J., to Thomas A. Edison, Inc., West Orange, N. J.

Method preserving fermentable organic materials, comprising the addition of a mixture of a polychloro-phenol and a metallic borate to said materials. No. 2,157,113. Thomas S. Carswell, Glendale, Mo., to Monsanto Chemical Co., St. Louis, Mo.

Process for dehydration of acetic and other lower fatty acids. No. 2,157,143. Donald F. Othmer, Brooklyn, N. Y., to Tennessee Eastman Corp., Kingsport, Tenn.

Preparation diesters of unsaturated glycols. No. 2,157,144. Anderson W. Ralston and William M. Selby, to Armour & Company, all of Chicago, Ill.

Manufacture halogenated alkyl phosphates. No. 2,157,164. Arthur John Daly and William Geoffrey Lowe, Spondon, near Derby, Eng., to the Celanese Corp. of America, a corp. of Delaware.

Process dehydrogenating cyclopentane to obtain substantial yields of cyclopentadiene. Nos. 2,157,202-3-4. Aristid V. Grosse, to Universal Oil Products Co., both of Chicago, Ill.

Olefin-polymerizing catalyst, comprising a mixture of tetra-phosphoric acid and a siliceous adsorbent therefore. No. 2,157,208. Vladimir Ipatieff and Raymond E. Schaad, to Universal Oil Products Co., all of Chicago, Ill.

Process for manufacture of potassium nitrate. No. 2,157,260. Jean Dessevre, Louis Durepaire, and Bernard Quanquin, Paris, France.

Method cooling hot gases. No. 2,157,318. Hans Baehr and Karl Braus, Leuna, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Method for hardening fibrous matter derived from animal hide materials. No. 2,157,319. Oskar Walter Becker, Heidelberg, Germany, to Naturin Gesellschaft mit beschrankter Haftung, Weinheim, Germany.

A buffered detergent solution containing alkyl sulfates of the higher alkanols. No. 2,157,320. Hyym E. Buc, Roselle, N. J., to Standard Oil Development Co., a corp. of Delaware.

Preparation a polymerized mixture of vinyl ethers of aliphatic glycols and carbohydrates. Nos. 2,157,347-8. Walter Reppe and Otto Hecht, Ludwigshafen-on-the-Rhine, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

A differential recording spectrophotometer. No. 2,157,389. Robert Hiram Park, Short Hills, N. J., to Calco Chemical Co., Inc., Bound Brook, N. J.

Catalytic hydrogenation of aliphatic nitro compounds to the corresponding amines. No. 2,157,391. Byron M. Vanderbilt, Terre Haute, Ind., to Commercial Solvents Corp., Terre Haute, Ind.

Method for bonding sprayed metal to wood. No. 2,157,456. Alfred Koyemann, Hamburg, Germany, to Naamlooze Vennootshap Derde, Nederlandsche Patentenmaatschappij (D. N. P. M.) The Hague, Netherlands.

Apparatus for feeding salt solution from a reservoir containing same. No. 2,157,466. Clair V. Swearingen, Chattanooga, Tenn.

Apparatus for producing a combustible gas from a hydrocarbon of low boiling point. No. 2,157,487. Arthur Holden and William A. Brown, Los Angeles, Calif., to Gasolitor Co. Inc., Los Angeles, Calif.

Preparation chlorine monoxide from the interaction of alkali carbonates with chlorine. Nos. 2,157,524-5. George H. Cady, Wadsworth, Ohio, to Pittsburgh Plate Glass Co., Allegheny County, Pa.

Method for preparing hypochlorites of the alkali and alkali earth metals, from chlorine, chlorine monoxide, and the corresponding hydroxides, in the presence of liquid carbon tetrachloride. Nos. 2,157,558-9. Irving E. Muskat, Akron, and George H. Cady, Wadsworth, Ohio, to Pittsburgh Plate Glass Co., Allegheny County, Pa.

Process for treating solid, gas-adsorbent solid materials. No. 2,157,-565. Stuart Pexton, William Kenneth Hutchison, and Falconer Moffat Birks, London, Eng., to The Gas Light & Coke Co., Westminster, London, England.

A paraffin wax of high melting point. No. 2,157,625. James M. Page, Jr., Casper, Wyo., to Standard Oil Co., Chicago, Ill.

Apparatus for drying and cooling pastes and slurries. No. 2,157,716. Theodor Muller, Leverkusen-I. G. Werk, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Basic lead naphthenate, and cobalt naphthenate. Nos. 2,157,766-7. Kenneth E. Long, South Euclid, Ohio, to The Harshaw Chemical Co., Cleveland, Ohio.

Process for removing hydrogen sulfide and analogous acidic impurities from liquids. No. 2,157,879. Ernest W. Zublin, to Shell Development Co., both of San Francisco, Calif.

Continuous process for purifying vegetable and animal oils. No. 2,157,882. Daniel Irving Ashworth, Wappingers Falls, N. Y., to The De Laval Separator Co., New York City.

Process for dehydrogenating cyclopentane to obtain substantial yields of cyclopentadiene. Nos. 2,157,939-41. Jacque C. Morrell, to Universal Oil Products Co., both of Chicago, Ill.

Process for removing caffeine from coffee. No. 2,157,956. Walter C. Hasselhorn, and Joseph John Thompson, to Kellogg Co., all of Battle Creek, Mich.

Apparatus for delivering liquids and viscous materials. No. 2,157,970. Thomas Carlyle Ellison Rowland, Solihull, and Harry Parker, Birmingham, England.

Method for processing polyvinyl halides. No. 2,157,997. Samuel L. Brous, Akron, Ohio, to The B. F. Goodrich Co., New York City.

Process for rendering earth masses or loose subsoils impermeable, or for fixing same, comprising essentially impregnation with an aqueous dispersion of bituminous and other finely-divided materials. No. 2,158,-025. Jan van Hulst and Gerrit Hendrik van Leeuwen, Amsterdam, Netherlands, to The Patent and Licensing Corp., New York City.

Carbon monoxide condensation catalyst, a hydrated boron trifluoride compound. No. 2,158,031. Donald J. Loder, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

A vitrifiable ceramic bonding material, suitable as an abrasive, comprising a granulated frit of silica containing smaller amounts of boron trioxide and alkali metal oxide, admixed with silicon carbide particles, and a suitable plasticizer. No. 2,158,034. Lowell H. Milligan and Robert H. Lombard, to Norton Company, all of Worcester, Mass.

Ceramic refractory material containing zircon and ferrosilicon. No. 2,158,035. John D. Morgan, South Orange, N. J. and Russell E. Lowe, New York City, to Power Patents Co., Hillside, N. J.

Leather

Process for alkaline depilation of hides and skins. No. 2,155,087. Wolfgana Grassmann, Dresden-Loschwitz, and Herbert Schelz, Dresden, Germany, to Studiengesellschaft der Deutschen Lederindustrie G.m.b.H., Dresden, Germany.

Method for curing hides with tryptase molds. No. 2,157,969. Otto Rohm, Darmstadt, Germany.

Metals and Alloys

A new apparatus for the cyanidation method of separating precious metals. No. 2,154,465. Louis D. Mills and Thomas B. Crowe, Palo Alto, Calif., to The Merrill Co., San Francisco, Calif.

Preparation of electrolyte-free colloidal metallic hydroxides. No 2,154,603. Rudolph S. Bley, Elizabethton, Tenn.

Method stabilizing powdered manganese alloys, wherein alkaline material is admixed to form a superficial coating of oxide upon the particle surfaces. No. 2,154,607. Ernest F. Doom, Niagara Falls, N. Y., to Electro Metallurgical Co., of West Virginia.

A magnetic ferrous alloy, comprising iron, nickel, aluminum and silicon; the two former are melted, treated with a trace of strontium peroxide, ferro-silicon and aluminum then being added. No. 2,154,613. Robert G. Guthrie, Chicago, Ill.

Electric contacting element, composed of chromium containing not over 10% tin. No. 2,154,700. Samuel Ruben, New Rochelle, N. Y.

Alloy for cast dentures, consisting of nickel, with 10-50% cobalt, 5-30% chromium, and 1-10% boron. No. 2,155,047. Cornell Joel Grossman, Millburn, N. J.

Process and apparatus for the preparation of metallic oxides from corresponding salts; comprises essentially a continuous system in which a finely atomized mixture of the salt and a vaporizable liquid is sprayed into an atmosphere of heating gas at a temperature sufficient to completely disperse the liquid, the suspended matter being swept through the chamber whose further end is provided with air ports. No. 2,155,119. Karl Ebner, Oberursel, near Frankfort-on-the-Main, Germany, to American Lurgi Corporation, New York City.

Aluminum-soldering compound, comprising a complex of tin and a halide of a hydrogen-rich amine base. No. 2,155,307. Wilhelm Hagemann, Bonn-on-the-Rhine, Germany; Emmy Hagemann, Bonn-on-the-Rhine, Germany, sole heiress of Wilhelm Hagemann, deceased, to Kuppers Metallwerk, Kom.-Ges. Bonn.

Process smelting a bismuth-free copper melt, by addition of sufficient finely divided silicic acid to the copper ore such that the fluxing of iron, and bismuth, is greatly enhanced. No. 2,155,325. Otto Nielsen, Ilsenburg/Harz, Germany, and Erwin Richard Lauber, Rorschach, Switzerland; said Lauber to said Nielsen.

Alloy steel, for which is claimed high resilience and resistance to shock and fatigue: Carbon (0.45-1.00%), Manganese (0.40-1.25%), Chromium, trace to 0.75%; Titanium (0.01-0.10%). No. 2,155,347. Marcus A. Grossmann, Chicago, Ill., to United States Steel Corp., New York City.

Alloy steel for which is claimed high resistance to fatigue and shock: Carbon, from 0.45-1.25%; manganese, from 0.40-1.25%; titanium, from 0.01-0.10%. No. 2,155,348. Marcus A. Grossmann, Chicago, Ill., to United States Steel Corp., New York City.

Alloy steel for which is claimed high resilience and resistance to shock and fatigue: Carbon (0.45-1.00%), manganese (0.40-1.25%), chromium to 0.75%, and vanadium (0.075-0.20%). No. 2,155,349. Walther Mathesius and Marcus A. Grossmann, Chicago, Ill.; said Grossmann to United States Steel Corp., New York City.

Alloy steel for which is claimed high resistance to fatigue and shock: Carbon, from 0.45 to 1.00%; manganese, from 0.40 to 1.25%; and vanadium, from 0.075 to 0.20%. No. 2,155,350. Walther Mathesius, Pittsburgh, Pa., and Marcus A. Grossmann, Chicago, Ill.; said Grossmann to United States Steel Corp., New York City.

Copper alloy for electrical conductors, for which is claimed both high conductivity and high tensile strength; comprises nickel and phosphorous in fixed proportion; also cadmium and/or tin and/or zinc in fixed proportions; total composition, including the copper, to constitute at least 93% of the alloy. No. 2,155,407. Donald K. Crampton, Marion, and Henry L. Burghoff, Waterbury, Conn., to Chase Brass & Copper Co., Waterbury, Conn.

U. S. Chemical Patents
Off. Gaz.—Vol. 501, Nos. 3, 4—Vol. 502, Nos. 1, 2—p. 108

U. S. Chemical Patents

Off. Gaz.—Vol. 501, Nos. 3, 4—Vol. 502, Nos. 1, 2—p. 109

Copper alloy for which is claimed age-hardenability and small grain size; comprises beryllium (0.4-2.5%), nickel (0.1-2.0%), phosphorous (0.02-0.40%); nickel and phosphorous to be in fixed proportion. No. 2,155,408. Donald K. Crampton, Marion, and Henry L. Burghoff, Waterbury, Conn., to Chase Brass & Copper Co., Waterbury, Conn.

Fluorescent screen for cathode-ray apparatus, comprising a deposition of a mixture of zinc and cadmium silicates, with a coating of an alkaline earth metal thereover. No. 2,155,465. Rudolf Behne, Berlin-Lichterfelde, and Heinrich Hinderer, Berlin-Zehlendorf, Germany, to Fernseh Aktiengesellschaft, Zehlendorf, near Berlin, Germany.

Method for separation of tin from admixtures of same with lead, in the molten state. No. 2,155,545. Thomas E. Harper, Jr., and Gustave Reinberg, La Oroya, Peru, to The American Metal Co. Ltd., New York City.

Method preventing adherence of congealed substances to metals. Nos. 2,155,592-3. Charles Hardy, Pelham Manor, N. Y., to Hardy Metallurgical Corp., of Delaware.

Manufacture a porous-bodied aluminum alloy. No. 2,155,651. Claus Guenter Goetzel, New York City, to Hardy Metallurgical Corp., a corp. of Delaware.

Manufacture abrasive materials from electrothermal reduction of metallic oxides with carbon in a furnace. No. 2,155,682. Raymond R. Ridgway, Niagara Falls, N. Y., to Norton Company, Worcester, Mass.

Process removing shale from naturally occurring borate materials. No. 2,155,784. George A. Connell, San Pedro, and John P. Rasor, Boron, Calif., to Pacific Coast Borax Co., a corp. of Nevada.

Wet method for magnetic separation of ores and metals containing feebly magnetic and nonmagnetic particles; also, apparatus designed for said method. No. 2,156,125. Clarence Q. Payne, Stamford, Conn.

Plant apparatus for smelting mercury ores. No. 2,156,192. Jorge Pluschke, Mexico, D. F., Mexico.

Antiseptic and preservative medium, having as the active ingredient a higher alkyl derivative of a guanyl and biguanyl compound. No. 2,156,-193. Bruno Puetzer, Albany, N. Y., to Winthrop Chemical Co., Inc., New York City.

Method flotation phosphate rock by a froth process. No. 2,156,245. Harry Levi Mead and Joseph Leonard Weaver, Brewster, Fla., to American Cyanamid Co., New York City.

Process and apparatus for smelting iron ore to a sponge iron, by direct reduction in a continuous process. No. 2,156,263. Kazuji Kusaka and Haruyuki Ashida, to Minami Manshu Tetsudo Kabushiki Kaisha (South Manchuria Railway Co.), of Darien, Manchukuo.

Welding rod of austenitic steel for fusion welding of non-austenitic alloys, comprising carbon, not exceeding 0.35%, 13% to 26% manganese, 3% to 15% chromium. No. 2,156,299. Franz Leitner, Kapfenberg, Austria to Giebr. Bohler & Co., Aktiengesellschaft, Wien, Vienna, Germany.

Method for welding of non-austenitic steel members with a fully austenitic nickel-manganese steel welding rod. Nos. 2,156,306-7. Franz Rapatz, Buderich-Dusseldorf, Germany, to Gebr. Bohler & Co., Aktiengesellschaft Wien, Vienna, Germany.

Copper-zinc alloy, claimed to have corrosion-resistant properties, containing copper (30-45%), at least one of the group cobalt and nickel (3-12%), and manganese (4-15%). No. 2,156,348. Wolf Johannes Muller and Moritz Niessner, to Oesterreichische Dynamit Nobel Aktiengesellschaft, both of Vienna, Austria.

Method for electrodeposition of tin, comprising essentially its deposition in an aqueous solution containing a tar acid, pyroligneous acid, and a mineral acid. No. 2,156,427. Jehu P. Cooper, Woodbridge, and Donald Willis Light, Perth Amboy, N. J., to International Smelting and Refining Co., Perth Amboy, N. J.

Process annealing black plate, followed by dipping in tin without exposure to air. No. 2,156,607. Matthew Schon, to Crown Cork & Seal Co., both of Baltimore, Md.

Sintered lead alloy prepared by hydrogen reduction of the corresponding oxides; reduced product compressable into useful shapes. No. 2,156,802. Hugh S. Cooper, Shaker Heights, Ohio, to Cooper Products, Inc., Cleveland, Ohio.

Manufacture gel-type metallic oxide catalysts. Nos. 2,156,903-4. Robert F. Ruthruff, Nutley, N. J., to Process Management Co. Inc., New York City.

Method increasing resistance of "18-8" stainless steels to saline pit corrosion. No. 2,156,914. Albert L. Kaye and Robert S. Williams, Belmont, and John Wulff, Cambridge, Mass., to Chemical Foundation, Inc., New York City.

Corrosion-resistant austenitic chrome nickel steel alloys. No. 2,157,060. Paul Schafmeister, Essen, Germany, to Krupp Nirosta Co. Inc., New York City.

Thermo-chemical method for desurfacing ferrous metal bodies. No. 2,157,095. James Harold Bucknam, Cranford, N. J., to The Linde Air Products Co., New York City.

Bearing alloy, containing 0.75-1.50% antimony, 2.50-5.00% silver, 17-23% cadmium, and the balance, of lead. No. 2,157,121. Ernest R. Darby, Lawrence A. Barera, and Philip J. Potter, to Federal Mogul Corp., all of Detroit, Mich.

Process for the bright-plating of zinc. No. 2,157,129. Viola Hoffman, Cleveland, O.

Scale-resistant alloy for use at high temperatures, containing iron, and 0.01-0.30% carbon, 15-30% manganese, and over 3.00-10.00% silicon. No. 2,157,146. Gerhard Riedrich, Krefeld-Forstwald, Germany, to Deutsche Edelstahlwerke Aktiengesellschaft, Krefeld, Germany.

Hot- and cold-workable copper alloy, containing 0-1-5.0% silicon, 0.1-5.0% manganese, and 0.005-0.250% of an alkali metal of the group potassium and lithium. No. 2,157,149. Cyril Stanley Smith, Cheshire, and Earl W. Palmer, Waterbury, Conn., to The American Brass Co., Waterbury, Conn.

Method improving corrosion-resistance of aluminum-magnesium alloys. No. 2,157,150. Francis P. Somers, Upper Darby, Pa., to Aluminum Co. of America, Pittsburgh, Pa.

Method roasting sulfur-rich nickel matte. No. 2,157,254. Niels Sofus Borch, Copenhagen, Denmark, to F. L. Smidth & Co., New York City.

A magnesium alloy, containing major amounts of aluminum, zinc, and copper, and minor amounts of manganese, nickel, cobalt, chromium, molybdenum; magnesium content fixed at 15%. No. 2,157,322. Fritz Christen, Zurich-Alstetten, Switzerland.

Decomposition tungsten sulfide materials. No. 2,157,332. Paul Hermann Gericke, Hans Heinrich v. Baumbach, and Fritz Berndt, Leuna, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Lead alloy, resistant to chemical corrosives, containing 0.3-1.30% antimony and 0.2-5.0% mercury. No. 2,157,383. Francois Cuvelliez, Hoboken, near Antwerp, Belgium, to Societe Generale Metallurgique do Hoboken, Hoboken, near Antwerp, Belgium.

Method manufacturing cast iron of increased strength, comprising the addition to the melt of an unbonded material containing carbon (25-75%) and one of the group silicon-zirconium; amount of added mixture not exceeding 1% of the melt. No. 2,157,390. William J. Priestly, New Rochelle, N. Y., to Electro Metallurgical Co., a corp. of W. Va.

Welding composition, consisting of a white metal alloy containing sufficient sodium bicarbonate to ensure a fusing mixture. No. 2,157,447. Cliff A. Williams, Dallas, Tex., to Stanley D. Bowles, Dallas, Texas.

Method for chromizing ferrous metals. No. 2,157,594. Hugh S. Cooper, Cleveland Heights, Ohio, to Cooper Products, Inc., Cleveland, Ohio.

Method for preparing metal elements having qualities of high porosity, by molding the metals in powdered form, in a reducing atmosphere, to obtain a thin sheet of material. No. 2,157,596. James H. Davis, Dayton, Ohio, to General Motors Corp., Detroit, Mich.

Steel alloy compositions resistant to the effects of hydrogen at high temperature and pressure, containing up to 30% of material from the group including chromium, molybdenum, tungsten, and vanadium, and not over 5% from the group zirconium and thorium. Nos. 2,157,653-4. Friedrich Karl Naumann, Essen, Germany, to Fried. Krupp Aktiengesellschaft, Essen-on-the-Ruhr, Germany.

A free-machining open-hearth steel: Carbon (0.08-0.75%), manganese (1.00-1.50%), phosphorus and silicon (0.02% max.), and sulfur (0.18-0.30). Nos. 2,157,673-4. James A. Ridgely, Cincinnati, Ohio, to W. J. Holliday & Co., Indianapolis, InId.

Preparation of iron powder in an electrolytic cell, from ferrous sulfate solution containing also a soluble member of the group comprising sugar, urea, and glycerine. No. 2,157,699. Charles Hardy, Pelham, and Charles L. Mantell, Manhasset, N. Y., to Hardy Metallurgical Co. a corp. of Delaware.

Aluminum alloy requiring no heat treatment, containing about 1.75% copper, 1.50% tin, 0.20% titanium, 0.75% zinc, 0.90% magnesium, and 0.25% chromium. No. 2,157,741. Edward A. Schmeller, Lakewood, Ohio, one-third to Frank I. Schmeller, Rocky River, Ohio, and one-third to John L. Schmeller, Lakewood, Ohio.

Method for impregnating metal materials with silicon, essentially consisting of the application of a gaseous silicon chloride. No. 2,157,902. Harry K. Ihrig, to Globe Steel Tubes Co., both of Milwaukee, Wis.

Contact element of silver and indium, the latter being present in quantity ranging from 0.1 to 21%. No. 2,157,933. Franz R. Hensel and Kenneth L. Emmert, to P. R. Mallory & Co., Inc., all of Indianapolis, Ind.

Copper-magnesium alloy containing 0.1 to 3.0% magnesium, 0.1 to 5% of one of the group nickel, cobalt, iron, and 0.1 to 3.0% silicon. No. 2,157,934. Franz R. Hensel and Earl I. Larsen, to P. R. Mallory & Co., Inc., all of Indianapolis, Ind.

Tungsten alloy, containing 1-20% of molybdenum, and 0.01-10.00% rhenium. No. 2,157,935. Franz R. Hensel and Kenneth L. Emmert, to P. R. Mallory & Co., Inc., all of Indianapolis, Ind.

Tungsten alloy, containing 20-60% molybdenum and 0.01-25.00% rhenium. No. 2,157,936. Franz R. Hensel and Kenneth L. Emmert, to P. R. Mallory & Co., Inc., all of Indianapolis, Ind.

Method for incorporating metallic beryllium into a magnesium alloy, to produce substantially a beryllium alloy. No. 2,157,979. Hugh S. Cooper and Charles H. Van Dusen, Jr., Cleveland Heights, Ohio, to Cooper-Wilford Beryllium, Ltd., a corp of Delaware.

Paper and Pulp

Manufacture of a calcium sulfite-filled paper stock. Nos. 2,154,995 6. Francis G. Rawling, Piedmont, W. Va., to West Virginia Pulp & Paper Co., New York City.

A paper stock containing citric acid derivatives for preservation packaged products containing fats and oils. No. 2,155,731. Harold S. Mitchell, to Industrial Patents Corp., both of Chicago, Ill.

Petroleum

Cracking process for petroleum hydrocarbons. No. 21,066. Reissue. Lyman C. Huff to Universal Oil Products Co., both of Chicago, Ill.

Anti-knock gasoline process, converting hydrocarbons of molecular weights averaging 50 to 60, by pyrolysis into gasoline-boiling hydrocarbons. No. 21,073. Reissue. Hans Tropsch, deceased, by Carl W. von Helmolt, to Universal Oil Products Co., all of Chicago, Ill.

Process resolving water-in-oil type petroleum emulsions, characterized by the use of a demulsifier prepared by the action of a hydroxylated fatty acid upon a long-chain alkanoic-aromatic tertiary amine. No. 2,154,422. Melvin DeGroote, University City, and Bernhard Keiser and Charles M. Blair, Jr., Webster Groves, Mo., to The Tret-O-Lite Co., Webster Groves, Mo.

Process resolving water-in-oil type petroleum emulsions, characterized by the use of a demulsifier prepared by the action of a long-chain fatty acid upon an aromatic-alkanolamine. No. 2,154,423. Melvin De Groote, University City, and Bernhard Keiser and Charles M. Blair, Jr., to The Tret-O-Lite Co., all of Webster Groves, Mo.

Process for purifying petroleum distillates, comprising liquid-phase treatment of distillate with an alkaline earth metal compound, followed by treatment with an oxidizing gas in the presence of a sodium plumbite catalyst. No. 2,154,424. Clinton E. Dolbear, Los Angeles, Calif., to Philip Wiseman, P. Kenneth Wiseman and Clinton E. Dolbear, trustees.

Process purification petroleum lubricants by filtration through a series of units containing shaped alumina-silica particles of uniform shape, so disposed as to permit of regeneration in situ, after saturation with impurities has taken place. No. 2,154,434. George R. Bond, Jr., Paulsboro, N. J., to Houdry Process Corp., Dover, Del.

Process deasphalting and dewaxing petroleum crudes. No. 2,154,-493. Maurice B. Cooke, Plainfield, N. J., and Earl Petty, Scarsdale, N. Y., to Sun Oil Co., Philadelphia, Pa.

Process production of ethylene by cracking hydrocarbon alkanes, and means of recovering ethylene from continuous process, via aqueous ammoniacal copper. No. 2,154,676. Hans Haeuber and Josef Hirschbeck, Ludwigshafen-on-the-Rhine, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Process refining cracked petroleum distillates with an oil-soluble metallic soap of a fatty acid. No. 2,154,988. Masakichi Mizuta, Marunouchi, Kojimachi-ku, Tokyo, and Teiji Yoshimura, Okubo, Kashiwazaki-Machi, Kariha-gun, Niigata-ken, Japan, to Nippon Sekiyu Kabushiki Kaisha, Tokyo, Japan.

Process selective polymerization of sulfur impurities in petroleum hydrocarbons. No. 2,155,007. Thomas Oliver Edwards, Jr., Associated, and David Dewey Stark, Watson, Calif., to Tide Water Associated Oil Co., San Francisco, Calif.

U. S. Chemical Patents

Off. Gaz.—Vol. 501, Nos. 3, 4—Vol. 502, Nos. 1, 2—p. 110

Process for acid treatment of petroleum light-oil fractions. No. 2,155,367. Ashton T. Scott, Ardmore, Pa., to The Sharples Corporation, of Delaware.

Solvent refining process for petroleums containing naphthenic and paraffinic constituents; essentially, a method using furfural as the primary solvent refining agent. No. 2,155,644. Louis P. Evans, Beacon, N. Y., to The Texas Co., New York City.

Method for dewaxing mineral lubricating oil. No. 2,155,645. Louis P. Evans and Howard H. Gross, Beacon, N. Y., to The Texas Company, New York City.

Method increasing yield of neutral oil from wax-bearing crude materials. No. 2,155,745. Cary R. Wagner, Chicago, and Warren A. Raine, Evanston, Ill., to The Pure Oil Co., Chicago, Ill.

Emulsifier, comprising a mixture of fatty acid containing 9 to 20 carbon atoms in a straight chain with a tertiary amine of the group dimethyl- and diethyl-cyclo-hexylamine. No. 2,155,757. Charles Graenacher, Basel, and Richard Sallmann, Arlesheim, Switzerland, to Society of Chemical Industry in Basle, Basel, Switzerland.

Process for distillation of petroleum tar. No. 2,156,158. Edgar T. Olson, Marquette, Mich., and Raphael Katzen, Phelps, Wis., to Northwood Chemical Co., Phelps, Wis.

Method for chemical plugging of brine-bearing strata. Nos. 2,156,-219-20. Thomas H. Dunn, to Stanolind Oil & Gas Co., both of Tulsa, Okla.

Method recovering petroleum hydrocarbons from well fluid of distillate type. No. 2,156,234. George S. Bays, to Stanolind Oil & Gas Co., both of Tulsa, Okla.

Process and apparatus for the extraction of oils, fats, and the like from materials containing same; method comprises a continuous extraction unit utilizing a liquid solvent medium. No. 2,156,236. Michele Bonotto, Evansville, Ind., to Extractol Process, Ltd., Wilmington, Del.

Method for separating mercaptan intermediate products from petroleum distillates. No. 2,156,577. David Louis Yabroff, Berkeley, and Ellis R. White, Albany, Calif., to Shell Development Co., San Francisco, Calif.

Method polymerizing tertiary-olefin constituents, by acid hydration in the presence of a catalyst, to form higher boiling compounds. No. 2,156,-718. Franklin A. Bent, Russell W. Miller, and Simon N. Wik, Berkeley, Calif., to Shell Development Co., San Francisco, Calif.

Method stabilizing gasoline solutions of metal beta-diketones. No. 2,156,918. Willard E. Lyons, to Leo Corporation, both of Chicago, Ill.

Method converting olefinaceous hydrocarbons to hydrocarbons of the gasoline-boiling type. No. 2,157,220. Hermann C. Schutt, Mount Vernon, N. Y., to the Pure Oil Co., Chicago, Ill.

Sweetening method for hydrocarbon oils containing free sulfur. No. 2,157,223. Earl D. Sutton, Newark, Ohio, to The Pure Oil Co., Chicago, Ill.

Process yielding motor fuel of high anti-knock rating. Nos. 2,157,224-5. Cary R. Wagner, to The Pure Oil Co., both of Chicago, Ill.

Process for absorption hydrocarbons of different molecular weights, in the vapor phase, by selective "stripping." No. 2,157,343. George L. Mateer, Roselle, and Walter H. Rupp, Elizabeth, N. J., to Standard Oil Development Co., a corp. of Delaware.

Improving agent for hydrocarbon oils, essentially consisting of an oil-soluble phosphorous compound. No. 2,157,479. Troy Lee Cantrell and John Gordon Peters, Lansdowne, Pa., to Gulf Oil Corp., Pittsburgh, Pa.

Apparatus and process for recovering gasoline vapors. No. 2,157,579. George Gordon Urquhart, Cynwyd, Pa.

Process for separating mineral oil hydrocarbons. No. 2,157,821. Seymour W. Ferris, Aldan, Pa., to The Atlantic Refining Co., Philadelphia, Pa.

Pigments

Preparation of a vanadyl phthalocyanine pigment of a bright greenish shade. No. 2,155,038. John Stanley Herbert Davies and Max Wyler, Manchester, and Paul Anthony Barrett and Reginald Patrick Linstead, London, Eng., to Imperial Chemical Industries, Ltd., of Great Britain.

Printing ink, comprising approximately the following: 4.95 parts by weight of "collagel"-containing color pulp, 4.75 parts mixed drying oils containing about 5% triethanolamine stearate, and 1.27 parts of a lead-manganese oxidizing agent. No. 2,155,103. Ramon N. Shiva, Chicago, Ill.

A dispersable color powder, comprising a coloring agent, dispersing agent, and lactose, a non-dusting non-hygroscopic powder forming with water a stable reversible colloid. No. 2,155,326. Robert J. O'Brien, Belleville, N. J., to Collway Colors, Inc., Paterson, N. J.

Duplicating ink, comprising a mixture of dyes including chrysoidine, brilliant green, magenta, and crystal violet, incorporated in an oil and wax medium of M.P. approximately 138 deg. F. Nos. 2,155,861-2. William Jonse Hughes, Brooklyn, N. Y., to Manifold Supplies Co., Brooklyn, N. Y.

Preparation blue manganate pigments. No. 2,156,727. Erich Korinth, Frankfort-on-the-Main-Hochst, and Georg Meder, Munster, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

White paint mixture, containing elemental molybdenum of 150-mesh size, or finer. No. 2,157,205. William T. Hancock, Long Beach, Calif.

Manufacture a diazotype print. No. 2,157,206. Walker M. Hinman, Winnetka, Ill., to The Frederick Post Co., Chicago, Ill.

Method of setting a printing ink. No. 2,157,385. Albert E. Gessler, Ardsley-on-Hudson, Albert F. Guiteras, N. Y. City, and Charles F. Clarkson, Philadelphia, Pa., to Interchemical Corp., a corp. of Ohio.

Method of setting colored printing inks. Nos. 2,157,387-8. Charles J. MacArthur, Glen Ridge, N. J., to Interchemical Corp., a corp. of Ohio.

Production red chromium pigments. No. 2,157,712. Ekbert Lederle, Ludwigshafen-on-the-Rhine, Germany, to General Dyestuff Corp., New York City.

Rubber

Pigmented rubber composition, wherein the rubber matrix contains 30% or more of metallic phthalate. No. 2,155,539. Henry A. Gardner, Washington, D. C.

An artificial construction stone, comprising as the basic material shale admixed with bituminous binder in water; resulting paste is incorporated with melted rubber and pigment, the whole being shaped under pressure. No. 2,155,531. Frank L. Decker, Kimble, Pa.

Process reclaiming vulcanized rubber, comprising the heating of rubber above boiling point of water, in atmosphere containing water vapor and oxygen, at slightly increased pressure, until plasticization takes place. No. 2,154,894. William Gilbert Essex, Southport, Eng.

Method preparing a synthetic rubber from a sulfurized mineral oil and a rosinous oil, in the presence of mineral acid. No. 2,154,852. Ernst Kleiber, Lugano Via Trevano, Switzerland, to Hevapar S. A., Geneva, Switzerland.

Rubber-adherent alloy composition, comprising the following order of metallic lamina: nickel on copper on zinc on a ferrous base. No. 2,154,-834. William W. De Lamatter, Cleveland Heights, Ohio.

Fluid ester gum composition, comprising a dispersion in volatile solvent, consisting of a rubber hydrochloride and a resin acid ester. No. 2,154,-798. Herbert A. Winkelmann, Chicago, and James P. McKenzie, Evanston, Ill., to Marbon Corp., Chicago, Ill.

Method for rendering rubber filament inextensible, and for the winding of same. No. 2,157,463. Thomas Lewis Shepherd, London, Eng.

Resins, Plastics, etc.

Plasticized resin composition, composed of cellulose acetate or nitrate admixed intimately with a vacuum-distilled polyhydric alkanol ester of crotonic acid, said ester having been blown with air at an elevated temperature. No. 2,156,144. Herman A. Bruson, to Rohm & Haas Co., both of Philadelphia, Pa.

Preparation a resinous material from interaction naphtha crudes and phenols. No. 2,156,126. Joseph Rivkin, Pittsburgh, Pa., to The Neville Company, a corp. of Pennsylvania.

Phenolic resin having unreacted groups, comprising a phenolic-base resin containing a hexamethylenetetramine addition product. No. 2,156,-124. Emil E. Novotny, to Durite Plastics, Inc., both of Philadelphia, Pa.

Preparation a resin from a derivative of hydantoin, and formaldehyde. No. 2,155,863. Ralph A. Jacobson, to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Manufacture a rubber-like resiniferous material from polybasic alkyl and aryl reactants. No. 2,155,639. Theodore F. Bradley, Westfield, N. J., to American Cyanamid Co., New York City.

Preparation vulcanizable plasticizers from polymers of alkylenic nature. Nos. 2,155,590-1. Benjamin S. Garvey, Akron, Ohio, to The B. F. Goodrich Co., New York City.

Resiniferous material, and process for preparing same, comprising the reaction of propylene oxide with ethylene diamine, the product being heated with urea to form a water-soluble compound of resinous properties. No. 2,155,328. Max Paquin, Frankfort-on-the-Main, Germany, to General Aniline Works, Inc., New York City.

Preparation a light-stabilizing vinyl-polymeric resin compound. No. 2,157,068. Thomas F. Carruthers, South Charleston, and Charles M. Blair, Charleston, W. Va., to Carbide & Carbon Chemicals Corp., a corp. of New York.

Processing of cast polymeric resin sheets. No. 2,157,049. Willard F. Bartoe, Hulmeville, Pa., to Rohm & Haas Co., Philadelphia, Pa.

A plastic composition, comprising essentially a mixture of white cement slurry and rubber latex. No. 2,157,018. Albert George Rodwell, to Sydney Harrison Colton, both of London, England.

Resinous composition, comprising a polyvinyl halide and an ester of acetylated ricinoleic acid. No. 2,156,956. Maynard C. Agens, Schenectady, N. Y., to General Electric Co., a corp. of New York.

Manufacture a wool felt material including a substantial quantity of thermoplastic synthetic resin. No. 2,156,455. Johannes Kleine, Dessau, and Walter Brennecke, Dormagen, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

Manufacture a resiniferous plastic material, comprising the admixture with hexamethylene tetramine of the fluid polymerizate resulting from the sulfuric acid-condensed extract of the cashew nut shell. No. 2,156,431. Joseph N. Knzmick, Passaic, N. J., to Irvington Varnish & Insulator Co., Irvington, N. J.

Process manufacturing cellulose organic acid ester molding composition. No. 2,155,303. Frederick R. Conklin, Kingsport, Tenn., by mesne assignment, to Eastman Kodak Co., Jersey City, N. J., a corp. of N. J.

Process for continuous hydrogenation of rosinyl compounds, utilizing an activated nickel-silicon alloy catalyst. No. 2,155,036. Rollin J. Byrkit, Jr., Marshallton, Del., to Hercules Powder Co., Wilmington, Del.

A resinous composition, manufactured by reacting a phenol with an unsaturated fatty acid, in the presence of a very weak alkaline reagent, with application of heat; reaction product is then heated with a methylene derivative. No. 2,154,969. Howard L. Bender, Bloomfield, N. J., to Bakelite Corp., New York City.

Apparatus for extruding plastic material, wherein feeding parts have a positive electric charge, and the die a negative one, such that the moist plastic material cannot foul the rolling parts, and that slippage is diminished. No. 2,154,949. Sanford C. Lyons, Bennington, Vt., to Bird Machine Co., Walpole, Mass.

Process for preparation of polymerized rosin esters of higher viscosity, and of m.p. and M. W. up to twice that of the corresponding unpolymerized ester. No. 2,154,704. Paul Schnorf, Wiesli, Switzerland, to Hercules Powder Co., Wilmington, Del.

Glass substitutes, from a methacrolein condensate. No. 2,154,639. Otto Rohm and Walter Bauer, Darnstadt, Germany, to Rohm & Haas Co., Philadelphia, Pa.

Manufacture of a molded counter stiffener for shoes, employing a thermoplastic stiffening agent. No. 2,154,571. Willard Howard, Waban, Mass., to The Celastic Corp., Arlington, N. J.

Method for preparation cast resin plastics of the group consisting of phenol, its homologs, and formaldehyde; alkali-metal hydroxide is the sole condensing agent. No. 2,154,541. Leslie T. Sutherland, Yonkers, N. Y., to The Barrett Company, New York City.

Resin, comprising the interaction product of an acidic glyceryl acetate with rosin and succinic acid. No. 2,154,471. Israel Rosenblum, New York, N. Y.

Method of, and apparatus for, forming cylindrical shapes from extruded plastic material. No. 2,154,446. Albertus Hendrik Haupt, Somerset West, Cape Province, Union of South Africa, to Imperial Chemical Industries, Ltd., of Great Britain.

Process preparation purified sulfur-dioxide-olefinic resins of improved molding characteristics. No. 2,154,444. Frederick E. Frey and Paul A. Bury, Bartlesville, Okla., to Phillips Petroleum Co., Bartlesville, Okla.

Process manufacture vari-colored decorative plastics. No. 2,154,438. Frederick R. Conklin, Kingsport, Tenn., to Eastman Kodak Co., Jersey City, N. J.

Method for plasticization of polyvinylchloride. No. 2,157,697. Max Hagedorn, Dessau, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

U. S. Chemical Patents
Off. Gaz.—Vol. 501, Nos. 3, 4—Vol. 502, Nos. 1, 2—p. 110

U. S. Chemical Patents

Off. Gaz.—Vol. 501, Nos. 3, 4—Vol. 502, Nos. 1, 2—p. 111

Method of preparing a moldable plastic material from an intimate mixture of diatomaceous earth and cellulose acetate. No. 2,157,645. Manuel R. Ximenez, Plainfield, N. J., to Johns-Manville Corp., New York City.
Process for making a pecto-phenolic synthetic resin. No. 2,157,488. Richard Holzcker, Lake Wales, Fla.
Method forming resiniferous material from an aldehyde and a compound extracted from cashew nut shells. No. 2,157,126. Mortimer T. Harvey, East Orange, N. J., to The Harvel Corporation of New Jersey.
Method processing shaped articles of synthetic polyamides. Nos. 2,-157,117-8. John B. Miles, Jr., to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Textiles

Manufacturing process for artificial thread, and apparatus thereof. No. 2,154,609. Stuart O. Fiedler, Kenmore, N. Y., to E. I. du Pont de Nemours & Co., Wilmington, Del.
Process manufacturing an artificial thread, etc., from a viscose bath of a ripening degree equivalent to ammonium chloride number of 7. No. 2,154,893. Otto Eisenhut, Heidelberg, Hanns Rein, Homburg von der Hohe, and Hugo Widmann, Ludwigshafen-on-the-Rhine, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.
Apparatus for continuous production of thread from synthetic rayon solutions. No. 2,155,324. Adrian J. L. Moritz, Enka, N. C., to American Enka Corp., Enka, N. C.
Manufacture artificial textile materials of improved properties, from a base of an organic derivative of cellulose, containing a substantial amount of a plasticizer compatible therewith. Nos. 2,155,410-11. Henry Dreyfus, London, England.
Method producing crepe yarns from threads of a composition of an organic derivative of cellulose. No. 2,155,519. William Whitehead, Cumberland, Md., to Celanese Corp. of America, of Delaware.
Method of forming yarn, comprising the coating of animal fibre with a permanent deposit of sericin prior to spinning. No. 2,155,647. Leo Frenkel, New York City, to The Hatters' Fur Exchange, Inc., Walden, N. Y.
Manufacture yarn composed of short fur and hair fibres, having thereon a substance deposited from a solution of a sulfo-cyanide and sericin. No. 2,155,648. Leo Frenkel, Northboro, Mass., to Hatters' Fur Exchange, Inc., Walden, N. Y.
Bleaching method for dark-colored materials, comprising treatment of fabric with gaseous tert-butyl hypochlorite. No. 2,155,728. Paul La Frone, Magill, Ransomville, N. Y., to E. I. du Pont de Nemours & Co., Wilmington, Del.
Process manufacturing artificial silk from a viscose bath. No. 2,155,-934. Otto Eisenhut, Heidelberg, Hanns Rein, Homburg von der Hohe, and Erich Kaupp, Ludwigshafen-on-the-Rhine, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.
Process for dyeing textile materials, comprising an organic hydrophobe cellulose derivative and having incorporated and fixed therein at least one hydrophil polymeric component selected from the group consisting of mixed polymers of various resin-forming, unsaturated organic radicles. No. 2,156,069. Paul Schlack, Berlin-Treptow, Germany, to General Aniline Works, Inc., New York City.
Apparatus for spinning of rayon. No. 2,156,296. Hayden B. Kline, to Industrial Rayon Corporation, both of Cleveland, Ohio.
Method manufacturing a stiff cord material from synthetic yarn derived from cellulose. No. 2,156,491. Claude H. Daniels, Greenwich, Conn.
Method of, and apparatus for, processing regenerated cellulose continuous filaments. No. 2,156,923. Rene Picard, Paris, France, to E. I. du Pont de Nemours & Co., Wilmington, Del.
Method manufacturing cupramonnium rayon. No. 2,157,148. Fred J. Samerdyke, Rocky River, Ohio, to Industrial Rayon Corp., Cleveland, Ohio.
Cellulose acetate article of manufacture containing a plasticizer. No. 2,157,167. Camille Dreyfus, New York City.
Cellulose acetate artificial silk, treated with the reaction product of oxidizee castor oil and paraformaldehyde. No. 2,157,190. George W. Seymour, Cumberland, Md., to Celanese Corp. of America, a corp. of Delaware.
Preparation of some mercerizing lye solutions. No. 2,157,294. Heinrich Lier, to Chemical Works, formerly Sandoz, both of Basel, Switzerland.
Manufacture urethane derivatives containing carboxyl or sulfonic groups, as assistants for the textile industries. No. 2,157,362. Heinrich Ulrich and Paul Koerding, Ludwigshafen-on-the-Rhine, Germany, to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.
Treatment of vegetable fibre fabrics with a heavy-metal-ammonium naphthenate solution, to inhibit rotting. No. 2,157,727. Ronald A. Baker, Los Angeles, Calif., to Socony-Vacuum Oil Co., Inc., New York City.

Water, Sewage, etc.

Process for deacidification boiler feed water, wherein the water is first passed through a hydrogen-exchange filter, and then through a metal oxide gel pretreated with alkali. No. 2,155,318. Otto Liebknecht, Neubabelsberg, near Berlin, Germany, to The Permutit Co., New York City.
Methods and processes for removing halide ions from water; and for effecting like anionic exchanges. Nos. 2,157,507-111. Oliver M. Urbain and William R. Stemen, Columbus, Ohio, to Charles H. Lewis, Harpster, Ohio.